Crossbow Report: StrykeForce by BowTech

by Jon Teater of Archery Evolution

Archery Evolution received the coveted StrykeForce ™ produced by BowTech ® for its first of many to come crossbow tests. The focus of these types of tests is to determine, for a specified product, the performance characteristics. Additionally, the goal is to provide those archers that enjoy shooting and/or hunting with appropriate objective information, as well as some subjective commentary, for aiding in the purchase process. With that being said, this evaluation is by no means conclusive; some tests could not be performed due to limitation in resources, time, or budget. Each archer should assess what is important to him or her and interpret the results within the context of this article. As always, we recommend that anyone who is considering a crossbow should shoot as many different makes/models as possible to determine what best suits their individual needs and desires.

Due to the lack of testing methods/procedures available publically for crossbows, Archery Evolution has developed testing guidelines to help better understand the products that we will be evaluating. These methods are relatively new and may evolve as more products are tested.

Archery Evolution Testing Guidelines

1. Force-Draw Measurements

Scope: This guideline covers the testing method and technique that determines the energy storage abilities of a crossbow, actual letoff (if applicable).

Method:

1.1 The crossbow should be adjusted to desired peak Force-Draw and draw length (if applicable). The peak Force-Draw is defined as the pinnacle amount of weight required to draw the crossbow.

1.2 A device capable of holding and drawing a crossbow shall be utilized; this device shall control the crossbow as it is drawn for matters of consistency and repeatability. The drawing device should be attached to the string near the nocking location. A load cell or scale (force scale) shall be utilized to take Force-Draw curve measurements. The force scale shall indicate force within .1 pounds. The crossbow should be drawn so that no tension is released from the string during the draw cycle. Measurements should be recorded in a perpendicular manner from the string at one (1) inch increments or less; measurements shall begin at string from the static position (brace position) to the full-draw position. The static position is defined as the state of the crossbow in an undrawn position. The full-draw position is defined as the state of the crossbow in which the limbs and/or cams have been exercised and the string has been displaced and held by the crossbow trigger mechanism.

1.3 The recorded force levels for the Force-Draw curve shall be stated in pounds-foot.

2. Measuring Power-Stroke

Scope: This guideline covers the measurement method for determining the power-stroke of a crossbow. Power-stroke is defined as the distance the string travels, while storing energy, from the static position to the full-draw position.

Method:

2.1 The power-stroke shall be measured with a calibrated device such as a ruler or caliper. The device shall allow for precision equal to .0625 inches and the measurement shall be recorded within +/- .125 inches.

2.2 Measurements shall be taken from the front of the center point of the string at the static position to the front of the center point of the string at the full-draw position. The measurements are taken in a perpendicular manner from the string.

2.3 Measurements should be recorded in inches.

3. Measuring Method for Velocity

Scope: This guideline covers the testing method and technique in determining the velocity of a crossbow (compound or recurve style). Projectiles (also known as bolts or arrows) will be shot at a specified weight under standard test conditions.

Method:

3.1 The maximum Force-Draw shall be recorded and/or adjusted for measurement purposes (if applicable). The peak Force-Draw shall be measured within +/- 1 pound and noted during the test.

3.2 All components (accessories) that are included with the product shall be noted during the test. If additional components are requested for testing and are outside the normal configuration, the report should detail such variances.

3.3 The projectiles used can be of various configurations for desired weight and length specifications to accommodate various designs. Projectiles used in the test should not weigh less than the manufacturer's recommended specifications, unless otherwise directed. The projectiles utilized for testing do not need to be fletched. The projectiles shall remain within +/- .5 grains of the total stated weight.

3.4 The entrance gate of the chronograph shall be set at 36 inches (+/- .25 inches) from the front of the crossbow string at the static position.

3.5 The crossbow should be "warmed-up" for consistent velocity. These test rounds shall occur until the projectile velocity falls within a range of two (2) feet per second (fps). The velocity ranges as determined by multiple chronographs may vary during the initial and actual performance testing; any variances should be recorded in the report.

3.6 The recorded number of shots should be a minimum of five (5) for each projectile. The highest and lowest readings may be removed when calculating the average velocity if significant statistical variances are recorded.

3.7 The projectiles velocity shall be recorded in fps.

4. Noise Measurements

Scope: This guideline provides an indication of the noise output characteristics of a crossbow at the "point blank" range utilizing a series of shots with multiple arrow configurations.

Method:

4.1 Noise measurements should be taken in a controlled area, whereas, reflective qualities are not experienced. If possible, environmental factors such as temperature, humidity, pressure, etc. should be maintained.

4.2 The microphone shall be located at a distance of 36 inches (+/- .25 inches) from the front of the crossbow string at the static position. The microphone should be offset from the path of the arrow by six (6) inches (+/- .25 inches).

4.3 The recorded number of shots should be a minimum of five (5) for each projectile. The highest and lowest readings may be removed when calculating the average noise if significant statistical variances are recorded.

4.4 The average noise output for each crossbow should be calculated with dB(A) weighting.

5. Trigger Measurements

Scope: This guideline provides an indication of the amount of force and distance required to discharge a given crossbow.

Method:

5.1 The trigger should be fully engaged ("cocked") to allow for proper measurements.

5.2 The crossbow should be at the full-draw when taking peak-force trigger measurements. If unable to take consistent measurements due to the crossbow dynamics, an artificial method utilizing a load that mimics the weight maintained at full draw should be considered.

5.3 A load cell or scale (force scale) shall be utilized for testing and should record results within +/- 0.1 pound.

5.4 The force scale shall maintain proper alignment with the crossbow during testing.

5.5 The force scale shall have constant pressure applied during the testing.

5.6 The recorded number of trigger force measurements should be a minimum of five (5). The highest and lowest readings may be removed when calculating the average trigger force if significant statistical variances are recorded.
5.7 If able, force measurements may be taken concurrently with distance measurements to consider the area under the curve of the trigger.
5.8 The total distance the trigger travels will be recorded with a device that allows for precision equal to .0625 inches and the measurement shall be recorded to +/- .125 inches.

6. Projectile Precision

Scope: This guideline covers the method to determine how close the groups are shot together when shooting a crossbow. The measurement method is an indication of the crossbow and shooter's ability to hit the same point that was hit prior. This method does not consider crossbow calibration or adjustment.

Method:

6.1 The manufacturer's recommended/provided standard projectile shall be utilized for this portion of testing. Additional testing with other projectiles may be recorded.
6.2 The shooter or testing team shall repeat a sequence of five (5) shots for each group. The sequence of shooting shall be repeated a minimum of two (2) times with each applicable projectile. For each sequence of shooting groups, a single projectile shall be used. Should the projectile experience any changes, i.e. losing a fletch, fletch wrinkling etc., the testing should begin again with a new projectile.
6.3 The distances shall be recorded for each group. The distance shall be measured from the front of the crossbow string at the static position to the front of the target. The distance recorded shall be measured within +/- 1 inch. The target should align with the crossbow in both vertical and horizontal planes at each distance shot.
6.4 Shooting groups can be accomplished with a shooting platform that can maintain constant contact with the crossbow. Additionally, the shooting platform should have the ability to record any movements experienced when either drawing or shooting the crossbow.
6.5 Shooting groups can be done in various positions. Shooting from a bench with support of a bench rest, tripod, shooting bags or sand bags is recommended. The bench should be stable and be unyielding to the vibrational motion that occurs from firing the crossbow.
6.6 A telescopic sight may be utilized for this testing.
6.7 When recording shot groups, two (2) measuring methods to consider are mean radius and extreme spread. Mean radius is the average distance of all shots from the center of the group. The mean radius is an appropriate method as it indicates a statistical variance of the shots. Mean radius may not be used if shots are clustered together. Extreme Spread indicates the maximum distance between the furthest two shots, measured from center to center. The extreme spread specifies the outermost group dispersions.
6.8 The projectiles precision shall be recorded via the methods described in paragraph 6.7 and stated in inches. Measurements shall be recorded within +/- .125 inches.

Production Information and Testing:

Introduction:

BowTech is known for producing compound bows with tremendous speeds, this feature is no different with their new offering, the Strykeforce. The StrykeForce, released this year, replaces its popular brother the Desert Stryker. The crossbow is similar to its brother, but has morphed into a

StrykeForce

Contact Info	Stryker www.strykerxbow.com		
MSRP (w/o package)	$999	**Damping**	Whispertech String Stops, InVelvet ™
MSRP (w/ package)	$1,099	**Finish**	Realtree Hardwoods Green ® HD™
Limbs	Laminated Fiberglass	**Stock**	Composite
Strings/Cams	Manufactured by BowTech		

Performance at a Glance

Arrow	Speed	K.E.	Momentum
425 Grains	379.3	135.8	23.0
475 Grains	362.6	138.7	24.6
525 Grains	348.3	141.5	26.1

compact design that maintains an ever-present focus on speed! To produce such highly proclaimed speeds, the designers have utilized an aggressive Binary™ synchronized dual cam system.

The product was provided to Archery Evolution as a package, which includes a multitude of components that were examined thoroughly for any imperfections. The crossbow was received with the following items: (note some are included in the accessory package): quantity four (4) Stryker arrows (half moon nocks and field tips), telescopic sight with rings (some assembly and mounting required), sling, a quiver and mounting hardware, EZ2Draw rope cocking aid, trunions and an owner's manual. Please note that the crossbow was provided with a tapered flanged foregrip for proper mounting to the shooting platform used in this test, the pistol foregrip comes standard on these products.

The crossbow dimensions/weights measured out of the box:

Dimensions & Weight							
Model	Axle to Axle	Axle to Axle (full draw)	Power-stroke	Rail*	Overall Length	Mass Weight (including scope)	Mass Weight (without scope)
StrykeForce	18.375"	14.375"	15.125"	19.375"	37.25"	9.6 lbs	9.0lbs

Note: The "Rail" measurements were taken from the front of the rail to the front of the string at the full-draw position

Next, the crossbow went through a thorough inspection to determine any imperfections. The review focused on string/cables, eccentrics, limb and limb pockets, rail, prod, stock, butt plate, trigger housing, trigger and trigger guard. The review revealed minor tooling marks on the underside of both eccentrics. No burs or sharp edges were found on either eccentric. The e-clips installed on two (2) axles on the prod created minor wear on the Invelvet™ finish. Overall, this product was almost impeccable in the physical inspection department.

Thereafter, the product goes through a 100-150 shot cycling to verify functionality. Some minor testing was done, but the focus is to detect any issues or concerns with the product before starting the actual performance testing. There were no notable issues to discuss about the product from this segment.

The crossbow is next evaluated on the five (5) criteria outlined below:

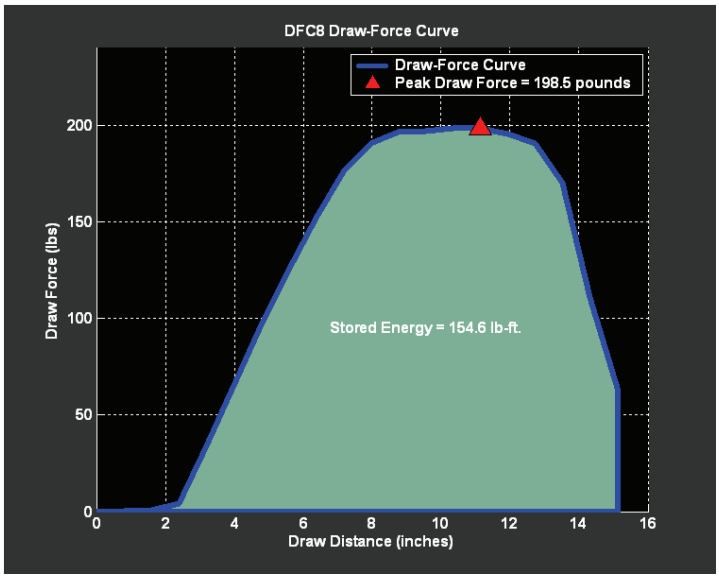
Test Category	Assessment
Dynamic Efficiency	Provides an indication of the amount of energy output by a crossbow relative to the energy expended through drawing the crossbow back. An assessment is made with multiple arrow weights.
Speed per inch of Power-Stroke	Provides an indication of the amount of speed output by the crossbow over the distance from the full-draw position to the static brace height position. An assessment is made with multiple arrow weights.
Noise Output	Provides an indication of the noise output characteristics of a bow at the "point blank" range utilizing a series of shots with multiple arrow weights
Trigger Force	Provides an indication of the amount of force required to discharge a given crossbow
Precision Test	Provides an indication of how close groups are shot together by utilizing a shooting machine and shooting from a bench rest.

Detailed Test Results

Dynamic Efficiency:

Dynamic Efficiency utilizes a Revere Load-Cell controlled by a winch device; the load-cell connects to the crossbow with a cocking aid. The crossbow is mounted in a shooting platform that controls any movement that might be experienced as Force-Draw curves are taken.

Peak Force		198.5	lbs
Stored Energy		154.6	lb-ft
Dynamic Efficiency	425 grains	87.9	percent
Dynamic Efficiency	475 grains	89.7	percent
Dynamic Efficiency	525 grains	91.5	percent



Speed/ Performance Measurements:

shot	Weight (grains)	Pact Chrono	CE Pro-Chrono	shot	Weight (grains)	Pact Chrono	CE Pro-Chrono	shot	Weight (grains)	Pact Chrono	CE Pro-Chrono
1	425	379.2	376	1	475	362.6	360	1	525	348.8	346
2		379.5	377	2		362.7	360	2		348.0	345
3		379.3	377	3		363.1	361	3		348.1	346
4		379.3	376	4		362.8	360	4		348.5	346
5		379.3	376	5		361.6	359	5		348.1	346
avg (fps)		379.3	376	avg (fps)		362.6	360	avg (fps)		348.3	346

Speed per inch of Power-Stroke:

	Weight	Speed Per Inch of PS	
Speed per inch of Power-Stroke	425 grains	25.1	
	475 grains	24.0	
	525 grains	23.0	
Measured Power-Stroke	15.125	inches	

Speed measurements taken with three (3) different arrow weights to determine the average speed of the crossbow. A 2009 Pact Chronograph XP and a Competition Electronics Pro-Chrono IR are set in tandem to record results. Also, the average speed measurements were divided by the power-stroke to determine the speed per inch of power-stroke.

Noise Output:

Sound measurements were recorded with 3 (three) different arrow weights to determine the average noise output, the average noise is A-weighted (dB A) (mimics the human ear). A CEL-430 sound level meter was used for this test.

Trigger Force:

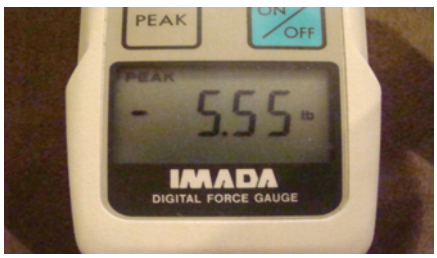
The average Trigger Force required to discharge the crossbow is measured; the force is measured in lbs. An Imada Digital Force Gauge was used in determining the Trigger Force.

Sound Measurements

Weight (grains)	425	475	525
Parameter	Peak A -Weighted Noise (dBA)		
1	~~94.8~~	93.6	92.6
2	95.2	93.9	~~93.0~~
3	95.0	~~94.2~~	92.3
4	~~95.4~~	93.6	~~92.2~~
5	95.0	94.1	92.6
6	95.1	~~93.4~~	92.5
7	95.1	94.0	92.4
8	95.1	93.7	92.7
9	95.0	93.6	92.2
10	95.2	94.1	92.4
Average	95.1	93.8	92.5
Total Avg Max	93.8		

Trigger Analysis

	Trigger Pull (lbs)
1	5.9
2	5.48
3	5.55
4	~~5.08~~
5	5.82
6	~~6.02~~
7	5.54
8	5.14
9	5.84
10	5.78
11	5.64
12	5.48
13	5.19
Average Trigger Pull (lbs)	5.58
Distance Traveled (inches)	0.1495

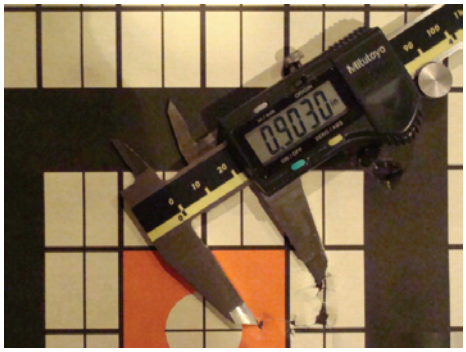


Projectile Precision

	Model/ Brand	Arrow Weight	Distance (yards)	Spread 1 (inches)	Spread 2 (inches)	Average
Shooting with Platform	Easton Pwr Bolt	446	40	0.929	1.204	1.0665
Shooting with Platform	Stryker	425	40	0.903	0.867	0.885
Shooting by hand	Easton Pwr Bolt	446	40	2.0905	2.927	2.50875

Precision Measurements:

Provides an indication of how close groups are shot together by utilizing a shooting machine and shooting from a bench rest. The method to calculate groups was extreme spread.



Overview:

The product received from the manufacturer was almost impeccable and this perspective transitioned well as the product underwent a vigorous performance test. The crossbow has some key technologies that supported first-rate results in the performance test. The use of the Center Pivot Technology was vital in testing, which helps to stabilize and control the laminate split limbs, and aids in the overall feel and balance of the product. Additionally, the reinforced laminated limbs are designed to withstand an immense amount of cable tension; this allows for an increase in stored energy and efficient transfer of energy into the arrow. Another noted feature is the Whispertech String Stops that dampen the vibration and reduce string oscillation after the shot. The trigger is another feature worth mentioning, this component has little to no creep (stacking), and its break is 100% predictable from shot to shot.

Although the product has some great features, we noted some areas that could be improved. After the crossbow is shot, the energy that remains in the form of vibration travels through components. The trigger ends up being a component that the vibration resonates through and is felt by the shooter. Another aspect of the trigger that could improve is some added adjustability, e.g. ability to change or adjust the trigger tension. Additionally, the telescopic scope provided in the package could use more magnification; with an increase in magnification, the shooter should be able to decrease group size at further distances.

The areas of strength as compared to competitors were apparent. The design of a rigid housing block, with a weaver rail, that allows for a multitude of sight attachments was the first item noted. Additionally, the same weaver accessory rail is integrated into the forearm and allows for adjustment of the pistol foregrip as well as mounting of other accessories. A major feature that was beneficial was the engagement sound as the crossbow reached full-draw; the trigger mechanism also employs the safety as the crossbow is cocked. Another safety feature that the product has is the dry fire prevention mechanism; this mechanism automatically places the safety on when a bolt is removed. One of the greatest benefits of this design was the cam technology. The difference amongst some of the competitors is not just summed up based on speed, but the advantage of the cam design on ease of drawing, which is due to the mechanical advantage of the cam and the minimum distance the peak weight is held during the draw cycle. Further, the EZ2Draw rope cocking aid is stated to support a 50% reduction when drawing the crossbow. In the end, the most impressive element of the product, as noted in the performance testing, was the precision shooting. The product was consistently putting each arrow almost or in some cases directly in the same hole as the previous. The device that is used to control the crossbow when being shot had indicated some minor lateral variation, which could explain why each arrow was not in the exact hole before, but it was impressive at a distance of 40 yards. In conclusion, the StrykeForce is favorable from a cost perspective as compared to some of the competitors, especially with the package, and the features noted will drive a favorable opinion with the consumer.

Special Thanks: We would like to thank the manufacturer and sponsors who supported this event; without them and their support, this evaluation would never have been possible.

SpyderWeb Targets were used throughout this test, we were fortunate since these targets were extremely easy for removing arrows. They withstood numerous shots at close distances and we never had a pass-through.

The **Easton** Carbon Power Bolts were great and allowed for numerous weight configurations; these were used in the performance tests.

The **Gold Tip** Crossfire series were used in the beginning stages of testing when the product was put through a 100-150 shot cycle test. These arrows survived some extensive shooting.

Scorpion Venom Archery Lubricants provided wax, lubricants and crossbow rail lube. The rail lube is stated to have the ability to increase speeds upward to 1-2 fps.