2025 PREMIER HUNTING

HOYT

WHITEPAPER

AXIS RX-9™

IN-DEPTH

HOYT TECHNICAL COLLABORATIVE

Contents

Real-World Speed

Improving performance was a major goal when developing the RX-9 and Alpha AX-2 series of bows. Not necessarily the advertised speed numbers, which are reported at 30 inch draw lenghts, but more specficially in the most common draw lengths. For example, we saw a **speed increase of 19 fps for the RX-9 Ultra** at a 29 inch draw length compared to the RX-8 Ultra. See the charts below for other speed improvements for RX-9 and AX-2 models.

Unlike other companies, Hoyt tests to ATA speed guidelines. These include parameters of:

- 350 grain arrow weight
- 70lb draw weight
- Draw length of 30", +/- 1/4"

The ATA speed test gives speed numbers that are far more realistic once an archer gets the bow fully built and ready for hunting. Other companies utilize an "IBO" speed measurement system, which has much looser testing parameters that include:

- Draw weight up to 80lbs +/- 2 lbs
- Arrow weight must be 5 grains per pound of draw weight
- No specified draw length standard

These testing parameters, combined with verbiage that vaguely rate speeds such as "up to X fps" allow companies to publish speed numbers that are inflated. By testing up to 82lbs, efficiencies can be found that garner a few extra feet per second that real-world archers won't see. The lack of a draw length standard can artifcially boost the rating signifcantly. It becomes quite easy to show an IBO speed rating that won't hold up when compared to ATA guidelines. At Hoyt, we perform comprehensive tests on competitor products, giving us an accurate gauge of true specifcations within the archery market.

Note: *The RX-9 SD and Alpha AX-2 SD do not reach draw lenghts of 30 inches, so they are tested at their max draw length of 27 inches and 70 pounds with a 300 grain arrow. Their speed rating is 310 fps.*

Alpha X 33 vs. Alpha AX-2 32

Speed Comparison

DRAW LENGTH	ALPHA X 33	ALPHA AX-2 32	DIFFERENCE
30	344	336	+2 fps
29	323	327	+4 fps
28.5	328	329	+1 fps
28	313	314	+1 fps

RX-8 Ultra vs. RX-9 Ultra

Speed Comparison

DRAW LENGTH	RX-8 ULTRA	RX-9 ULTRA	DIFFERENCE
30	332	340	+8 fps
29	313	332	+19 fps
28.5	306	324	+18 fps
28	303	319	+16 fps

Alpha X 30 vs. Alpha AX-2 29

Speed Comparison

DRAW LENGTH	ALPHA X 30	ALPHA AX-2 29	DIFFERENCE
30	344	340	-4 fps
29	325	330	+5 fps
28.5	316	322	+6 fps
28	322	322	0 fps

Axle-to-Axle Length

In general, longer bows are considered to be more stable. Some of this perception arises from the greater moment of inertia of longer risers and their mass distribution. Another portion of this feeling of stability and full draw comfort is generated by the larger string angle and tighter peep-to-eye distance that longer bows produce. But longer bows aren't ideal for hunting where a more compact rig is preferred. For only the second time in the history of Hoyt, we are offering a flagship bow with an axle-to-axle less than 30 inches. The **AX-2 29 is 29.5 inches axle-to-axle**, but thanks to Hoyt Optimized Geometry, it holds and shoots like a longer axle-to-axle bow.

Hoyt Optimized Geometry means the AX2 and RX9 can be compact rigs for hunting but still shoot like longer axle-to-axle bows, providing the stability and forgiveness demanded by serious bowhunters. How does this work? It has to do with the "effective string angle", meaning where the string comes off the cams at full draw. Alpha AX2 29 features an effective 31-1/16" string angle yielding a better peep position and string angle than typical 29" bows with tighter string angles and uncomfortable peep positions. For most shooters, a larger, more obtuse string angle will be preferred as it **gives a more comfortable anchor point and brings the peep sight closer to the eye**, and Hoyt's Optimized Geometry offers that, even in a compact hunting bow.

Weight & Stabilization

Alpha AX-2 Mass Weight

Out of the box, the AX-2 series bows are .4 pounds lighter than their Alpha X predecessors. The AX-2 represents approximately 1/4 pound saved in mass weight of the bare bow (without the Short Stop Stabilizer), which is the weight we publish in the specs, and the rest of the weight savings comes from a new and improved, lighter weight Short Stop 2.0 Stabilizer and removal of the Shock Pods. The design improvements to the AX-2 yielded a shot experience just as smooth and quiet as the Alpha X even without the Shock Pods, so we took them off to save weight without sacrificing smoothness.

Carbon RX-9 Mass Weight

The advertised weight of the Carbon RX-9 matches the RX-8 at 4 lbs. However, the out of the box weight is .3 pounds less thanks again to a new and improved Short Stop 2.0 stabilizer that comes standard on the bow, but is not included in the spec weight of the bare bow and a lighter weight limb pocket. The new AXL Limb and B6 pocket system on the RX-9 yield a more torsionally stable system, improving tuning and a quieter shot. The RX-9 Ultra LD (Long Draw) option utilizes the updated TXL limb optimized for longer draw confgurations while maintaining the increased torsional rigidity of the new AXL limb deployed in the AX-2 and RX-9 series bows.

Short Stop 2.0 Stabilizer

All RX-9 and AX-2 bows come equipped with the Short Stop 2.0 stabilizer installed in the lower stabilizer bushing. This location is lower and further forward on the bow than the standard stabilizer location directly below the grip. There are several advantages to this location including a lower center of gravity (CG) which means a lighter stabilizer will anchor the bow just as good in this location as a heavier stabilizer in the upper location. Also, because this location is farther forward on the bow, the included Short Stop 2.0 at only 2 inches in length puts the weight the same distance in front of the bow as a 7 inch stabilizer in the upper location.

Overall, your hunting rig weighs significantly less due to a lighter and shorter stabilizer in the lower location but the stabilization benefits are just as good, if not better. This is an important part of our In-Line Accessory system which aims to reduce the overall weight of your finished hunting rig while greatly improving how well it balances and aims at full draw.

HBX Gen 4 Cam System

The engine of the RX-9 and AX-2 is the HBX Gen 4 Cam System. As the name implies, this is the 4th iteration of our popular HBX cam system. Along with many other design improvements, the HBX cam system has changed the game when it comes to smooth draw, silent shots, and overall performance of our bows over the past few years.

The Gen 4 HBX cam preserved the smooth shot experience of previous HBX cams while increasing speed in many of the draw lengh positions across the draw length range. This is done through a new module system that increases efficiency in each inch of draw length instead of optimizing the module for the longest draw lenghts (the advertised draw lengths) and sacrificing performance at the shorter draw lenghts. It's easier to design a cam this way because you have less parts (less modules), but we didn't take the easy way with the Gen 4.

We designed 5 modules to optimize performance for every inch of draw length range. For example, the RX-9 Ultra at 29 inches gained 19 fps over the RX-8 Ultra. The modules are numbered 5,4,3,2, and 1, with module 5 being for the longest inch of draw length availale on a given model and module 1 being the shortest. Each module covers 3/4 of an inch in draw length range. For example, the number 5 module on the RX-9 maxes out at 30 inches and adjusts down to 29.25. The number 4 module will pick up at 29 inches and adjust down to 28.25, and so on.

Additionally, the Gen 4 has adjustable draw let-off positions so you can choose between 75%, 80% or 85% let-off by adjusting the postion of the mod foot, which is easily done by removing one screw. You can also choose from a hard wall or extra hard wall feeling at full draw by swapping the mod feet from top to bottom. Your bow will come with the feet in the extra hard wall position and if you want to try the hard wall position, you simply move the mod foot on the top cam to the bottom cam, and the mod foot on the bottom cam to the top cam. This is our most adjustable hunting cam ever to give you your most comfortable, best-fitting bow ever.

Gen 4 also improves tuning and center shot with the addition of a split harness to balance the load from the cables on both sides of the cam. This reduces cable-induced torque and cam lean, improving tuning and center shot consistency.

HBX Gen 4 Draw Length Chart

MOD	POS.	AX-2 29	RX-9	AX-2 32	RX-9 Ultra	RX-9 Ultra LD
5	A	30	30	31	31	32
	a	29 3/4	29 3/4	30 3/4	30 3/4	31 3/4
	B	29 1/2	29 1/2	30 1/2	30 1/2	31 1/2
	b	29 1/4	29 1/4	30 1/4	30 1/4	31 1/4
4	C	29	29	30	30	N/A
	c	28 3/4	28 3/4	29 3/4	29 3/4	N/A
	D	28 1/2	28 1/2	29 1/2	29 1/2	N/A
	d	28 1/4	28 1/4	29 1/4	29 1/4	N/A
3	E	28	28	29	29	N/A
	e	27 3/4	27 3/4	28 3/4	28 3/4	N/A
	F	27 1/2	27 1/2	28 1/2	28 1/2	N/A
	f	27 1/4	27 1/4	28 1/4	28 1/4	N/A
2	G	27	27	28	28	N/A
	g	26 3/4	26 3/4	27 3/4	27 3/4	N/A
	H	26 1/2	26 1/2	27 1/2	27 1/2	N/A
	h	26 1/4	26 1/4	27 1/4	27 1/4	N/A
1	I	26	26	27	27	N/A
	i	25 3/4	25 3/4	26 3/4	26 3/4	N/A
	J	25 1/2	25 1/2	26 1/2	26 1/2	N/A
	j	25 1/4	25 1/4	26 1/4	26 1/4	N/A
	K	25	25	26	26	N/A

HBX SD Cam System

For premium short draw performance, Hoyt has developed the new HBX SD Cam and Mod System with a **single module covering 23 to 27 inches in 1/2" increments**. This is the **first time Hoyt's premier line has been readily available in shorter draw lenghts**. In the past, if your draw length wasn't covered by our standard offering of premier bows, you were forced to choose a different model of bow in our line up. Well, you told us you wanted to shoot our best bows, so we listened and designed the HBX SD cam to accomodate draw lengths down to 23 inches. You're welcome! This all-new cam system is much smoother than the cam on our previous short draw bow model and offers 80% let-off.

HBX SD Draw Length Chart

MODULE	POSITION	ALPHA AX-2 29	CARBON RX-9
SD	A	27	27
	B	26 1/2	26 1/2
	C	26	26
	D	25 1/2	25 1/2
	E	25	25
	F	24 1/2	24 1/2
	G	24	24
	H	23 1/2	23 1/2
	I	23	23

Note Regarding Factor Specifications:
Let-off and holding weight numbers are precision factors which archers should understand and note for their reference. However, it is important to remember that data which can be measured with archery scales that are available to consumers should not be treated as absolute. Hoyt's experience shows that these scales often have great variability from one draw to the next and can easily be unintentionally manipulated to an incorrect reading if a scale is not drawn at the exact same angle and with the same tempo each time. Additionally, variations in string and cable construction, serving diameters, and loop lengths can cause variations in draw length, cam timing, let-off feel and effciency. Hoyt Factory WireWRX™ strings and cables are specifcally engineered for optimal performance on the HBX Gen 4 and SD cam systems and to preserve the tunes and performance specs developed by our engineers. See the following page for more info on WireWRX strings, including dimensions required for aftermarket strings and cables.

WireWRX Strings & Cables

WireWRX represents a project **two years in the making**, along with a signifcant investment in state-of-the-art string making equipment that was purpose-designed by Hoyt Engineers. WireWRX strings are designed as part of the bow system as a whole; and Hoyt bows are designed to operate at peak performance with WireWRXstrings - we call that **Hoyt Engineering Synergy**. WireWRX strings are designed to achieve **maximum speed and tunability**, with **minimal noise and vibration**, ensuring your Hoyt is hunt ready straight from the factory.

It is critical to note that aftermarket string systems can often infuence the speed, sound, vibration and tunability of the bow. Factors such as string material, serving material, twist rate, serving tension, fnished diameters and end-loop length all play critical roles in harness function. Hoyt's WireWRX specifcations are as follows:

Material – BCY X99
String Strand Count – 28
Cable Strand Count – 28
Yoke Strand Count – 28
Center Serving Diameter Service Range - .108-.115"
End Serving Diameter Service Range - .100-.110"

1,500 Dry-Fire Test

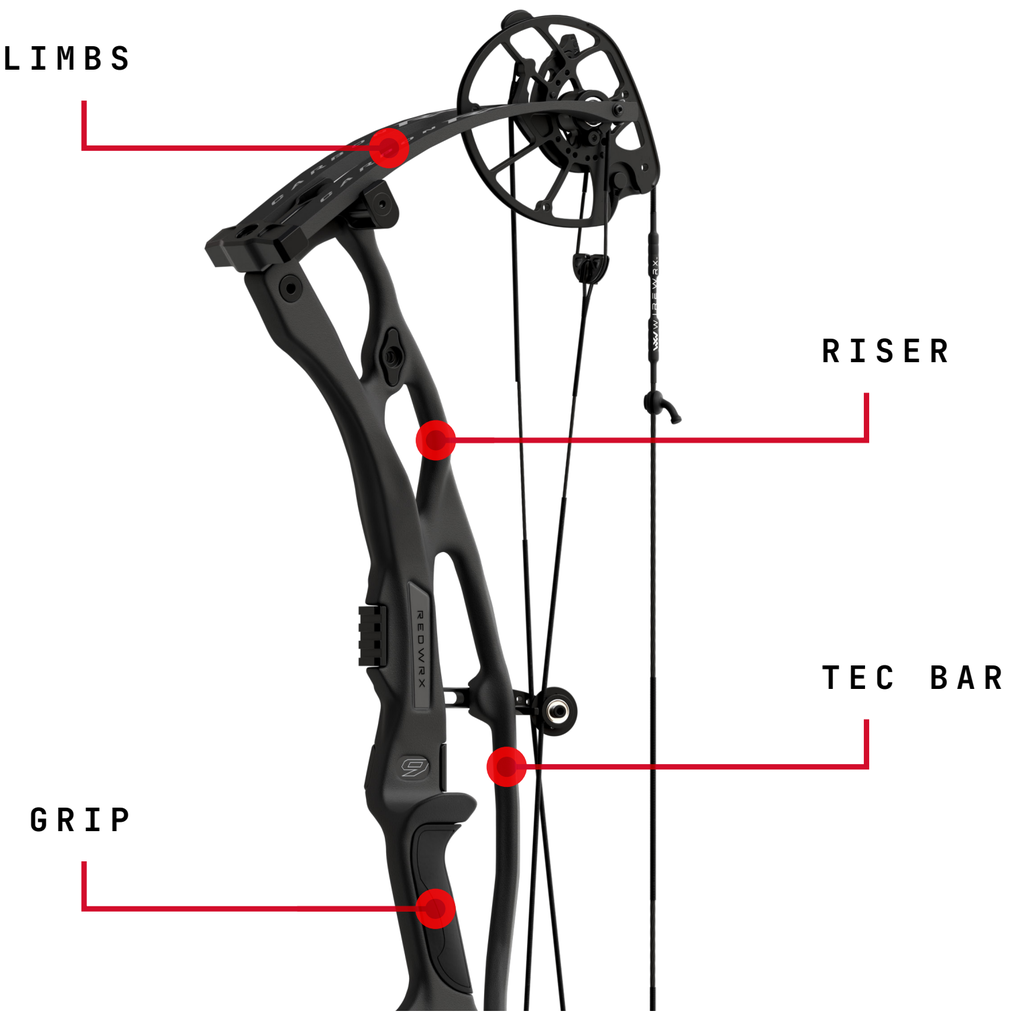
Hoyt bows stand out compared to all other bows on the market because of the riser design. The bridge section that runs behind the grip is called the TEC bar, which stands for Total Engineering Concept. It's the engineering feature that makes Hoyt bows unbelievable tough. How tough? Every Hoyt bow design has to **pass a grueling 1500 dry-fire test before it is approved** for production.

When a Hoyt engineer designs a new bow, he builds the first prototype to 80 pounds of draw weight and 30 inches of draw length and puts it in our automated dry-fire machine to begin the ultimate torture test. The machine does what it sounds like; it draws the bow back and cuts it loose and then grabs the string and does it again and again. The test will break many sets of strings, but if the riser cracks, breaks or bends at all, it doesn't pass the test and the engineers have to strengthen that area of the riser, make a new one, and do the test again.

The TEC riser design is what makes it possible for our risers to pass this test while also being super lightweight. Another huge benefit of the TEC design is that it allows us to have a smaller grip section than most other bows, which is important for accuracy because there is less surface area for hand torque to be unintentionally introduced, and it also makes for a more comfortable grip.

Hoyt limbs go through the same dry-fire torture test. They **have to pass 1000 dry fires without failing**, but it's worth saying that our limbs usually last the full 1500 dry fires when performing the riser dry-fire test, easily surpassing their requirement of 1000. Having said that, it is not recommeded to dry fire your bow.

Warning: *Never dry fire your bow. To dry fire your bow, means to shoot the bow without an arrow. Never try drawing a bow that is too heavy for your strength or that does not fit your draw length as this could lead to an unintentional dry fire. A dry fire could cause your bow to break and cause death or serious injury to you or others. If your bow is dry-fired there could be both seen and unseen damage and it should be returned to Hoyt or taken to a Genuine Hoyt Retailer for inspection before any further use.*



Shooter Experience

The Secret of Smooth

Carbon RX-9 and Alpha AX-2 are smoother than our smoothest bows. Many customers don't believe they are pulling 70 pounds when they draw the bow back for the first time because we have designed our draw force curve to make the draw as **smooth and effortless** as possible.

There are several benefits to this including being able to shoot more weight (if you want to) to get more speed and energy, being able to draw the bow and let it down slower and with more control in a close encounter hunting situation where you want to avoid being busted from harsh and quick movements, and enjoying longer shooting/ practice sessions to increase your accuracy and enjoyment from shooting. There is a lot that goes into how our engineers made the draw force so smooth, but without revealing our secrets, the answer has to do with the smallest tweaks to the draw force curve itself and how the energy is dispersed under the curve.

Natural Point of Aim & Rotational Torque Resistance

During the design and developement of the Concept X tournament bow, Hoyt engineers achieved the most stable and torque resistant bow we've ever made. They then implemented this critical design feature into the RX-9 and AX-2 hunting bows. This design feature was developed to specifically address bow alignment and the influences of rotational translation. This provides the shooter with natural alignment at full draw and less horizontal nock travel during the power stroke. Low rotational translation aids the shooter in maintaining natural bow-to-target alignment, or a natural point of aim, without the need to manipulate the grip or creating forces that work against the shooter's natural aiming pattern.

Addressing how the bow aligns at brace, aims throughout the shot process, and drives the arrow nock through the shot cycle improves tunability across different spines and diameters. This also yields a bow that is **more natural to hold when shooting at steep angles from tree stands** or in the mountains, and provides a **more forgiving bow under the pressure of a high-adrenaline shot.**

All of these accomplishments were made possible by the design integration of the riser, limb pockets, AXL limbs and HBX Gen 4 and SD cam systems. The new limb and pocket systems combined with improved riser torque characteristics yield a 38% reduction in torque from Alpha-X and RX-8- and up to an 82% reduction from comparable competitor bows. This yields an **improved natural point of aim and more forgiveness**, thus making the bow more accurate.

In-Line Accessory System

By focusing on the shooting experience and thinking outside the box, **Hoyt engineers broke out of the archery accessory paradigm and created a better system**. For years, sights and rests have always been mounted on the side of the bow, which meant the quiver had to stick out further to clear the sight and rest, creating a bow that was side-heavy and wouldn't balance. Stabilizers and side bars could be used to offset these side mounted accessories, but that just added even more weight to your bow. By **rethinking how accessories mount to the bow**, we greatly reduced the overall weight of your hunting rig while improving the balance and accuracy of your bow.

An integrated Picatinny Rail on the front of your bow makes it possible to mount your sight on the front of your bow, keeping the weight in line with your riser isntead off to the side. The arrow rest mounts to the back of the riser using the Integrated Mounting System®, once again, keeping the weight in-line with your riser instead off to the side. And now that the rest and sight aren't on the side of the bow, you no longer have clearance issues with your quiver and arrows and you can get the quiver closer to your bow, bringing it's weight closer to the center line of the bow for a better balance point.

Stabilizer location was also challenged and improved in the In-Line system by adding a stabilizer bushing lower and farther forward on the riser. There are several advantages to this location including a lower center of gravity (CG) which means a lighter stabilizer will anchor the bow just as good in this location as a heavier stabilizer in the upper location. Also, because this location is farther forward on the bow, the included Short Stop 2.0 at only 2 inches in length puts the weight the same distance in front of the bow as a 6 inch stabilizer in the upper location. So, overall, your hunting rig weighs significantly less due to a lighter and shorter stabilizer in the lower location but the stabilization benefits are just as good, if not better.

Our In-Line Accessories System is another example of **Hoyt Engineering Synergy** where two things are designed to work together to make them better together. Hoyt bows, when equipped with In-Line Accessories are over 10% quieter and have over 30% less vibration. This goes against the norm of accessories that add noise and vibration to your bow. Not to mention the overall weight of your accessoriezed bow will be lighter and it will balance better compared to ordinary, non In-Line accessories.

Tuning Guide

HBX Gen 4 cams can be tuned utilizing an aluminum cam spacer system. Below is a guide that will aid shooters in completing tuning shifts.

Note: *Cam spacer configurations do not need to match from top cam to bottom cam.*

It is also important to note that grip pressure, an archer's natural torque, and stabilizer bias will infuence the way that a bow tunes. It is Hoyt's recommendation to set centershot at 13/16"-7/8" and use spacers to correct the paper tune as close as possible. If more correction is needed, then it can be found with arrow rest micro-adjustments.

HBX Gen 4 Cam Tune Table

To correct a tail LEFT tear you want to move the cam to the LEFT by increasing the spacer thickness on the right side of the cam and decreasing spacer thickness on the left side of the cam. To correct a tail RIGHT tear you want to move the cam to the RIGHT by increasing the spacer thickness on the left side of the cam and decreasing spacer thickness on the right side of the cam. (Left and right orientation is designated when looking at the cam from the rear of the bow, or the string side of the bow, not when looking at it from the front of the bow, or the riser side of the bow.)

It is best to adjust one cam at a time and test to see if the tear is corrected. If the tear is not corrected, make an adjustment to the other cam, too. If the tear still is not corrected, increase the spacing again. Continue increasing cam spacing until the tear is corrected. Always use the same color spacers on an individual cam.

The chart below is an example of how to correct a tear by swapping spacers.
The large the tear, the further up or down the chart you may have to travel to correct the tear. This chart is for reference only and may not match the "baseline" or starting position of the spacers on your bow, but the concept is still the same – move the cam the direction of the tear.

TOP CAM

Thin Red / Thick Red	Thin Black / Thick Black	Thin Gray / Thick Gray	Thin Gray / Thick Gray	Thick Gray / Thin Gray	Thick Gray / Thin Gray	Thick Black / Thin Black	Thick Black / Thin Black	Thick Red / Thin Red

TO CORRECT A TAIL LEFT TEAR, MOVE THE CAMS TO THE LEFT

TO CORRECT A TAIL RIGHT TEAR, MOVE THE CAMS TO THE RIGHT

Thin Black / Thick Black	Thin Black / Thick Black	Thin Black / Thick Black	Thin Gray / Thick Gray	Thin Gray / Thick Gray	Thick Gray / Thin Gray	Thick Gray / Thin Gray	Thick Black / Thin Black	Thick Black / Thin Black

BOTTOM CAM

Note: On some spacer configurations at the far ends of the chart, inadequate cable clearance could be an issue. Inspect for cable rub on the cam after making spacer adjustments.