SUPER TUNING ARROWS

Why Spine Matters

Throughout a shot cycle, an immense amount of energy is placed into the bow at full draw. This energy is then transferred into the arrow upon release. This rapid transfer of dynamic force causes the arrow to flex and oscillate. If too much flex occurs in the shaft, then the arrow will have a hard time recovering and flying straight. Conversely, if the arrow doesn't flex enough, then it could fail to properly clear the bow and won't be as forgiving as it flies downrange.

The most accurate arrow will be the one with the proper balance of flex and forgiveness as it leaves the bow, and necessary stiffness to recover and stabilize as it begins to head downrange.

Understanding arrow stiffness

The spine, or "stiffness", of an arrow is a simple concept to understand, yet its importance is often overlooked. To understand what arrows, you should be shooting out of your bow, you need to understand what arrow spine is, how it is calculated, and why finding the "right arrow" – or at least the best one – takes some forethought.

Arrow spine is evaluated by "deflection", which is a measurement of the shaft's propensity to bending when force is applied. The traditional way spine ratings are determined is by taking an arrow shaft at a length of 28", supporting it at both ends, and hanging a 1.94 lb. weight at the center. The amount of flex that is induced on the arrow shaft by the force of the weight is then measured and gives us our "static" spine rating. For

example, if an arrow bends one half of an inch at the center, then the shaft has a static spine deflection of .500". Because this numerical deflection is a representation of a physical measurement – that is the arrows resistance towards a static force – a stiffer shaft will have a lower Deflection number (less bend), and a weaker shaft will have a higher deflection number (more bend).

The most common deflections for hunting arrows are from 500 on the "weaker" end, to 200 on the stiffer end, with increments in between. (It is worth noting that some manufacturers use their own numerical systems, so be sure to check and see how the manufacturer's classifications compare to the actual shaft deflection rating.

With all modern arrows it's not necessary to measure the spine to find out what its rating is, as the manufacturers have already done this for us. Rather we are looking to get shafts that are as close to identical as possible. This is very important when shooting broad heads.

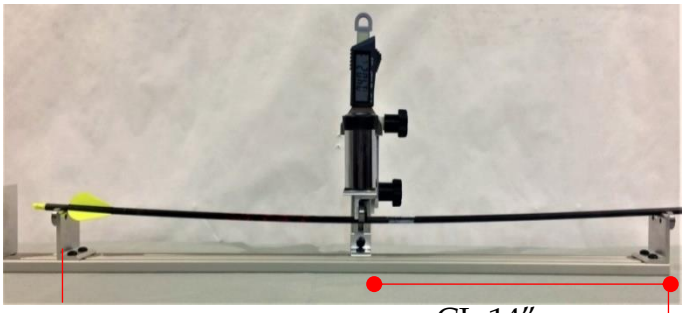
Spine-Tester Digital

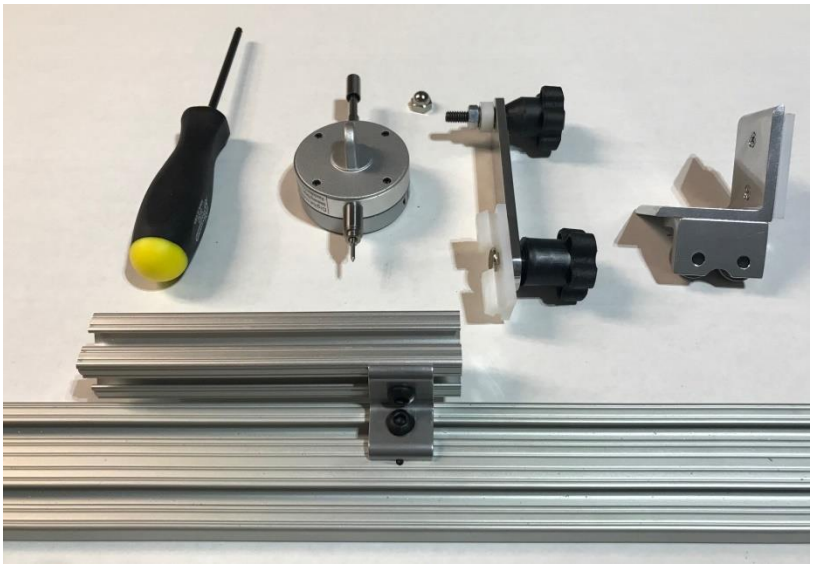
For more info see

www.coopsbowsmith.com

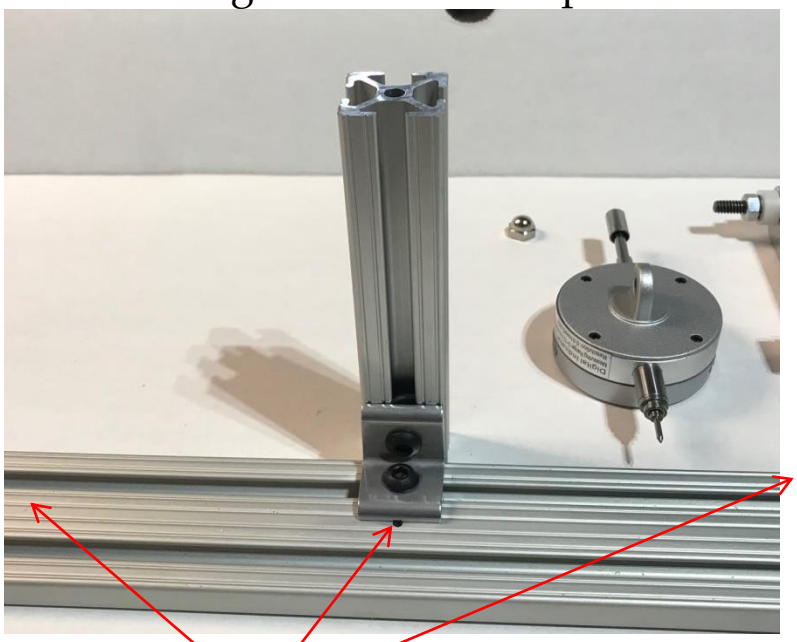
Our new digital gage.

Very accurate

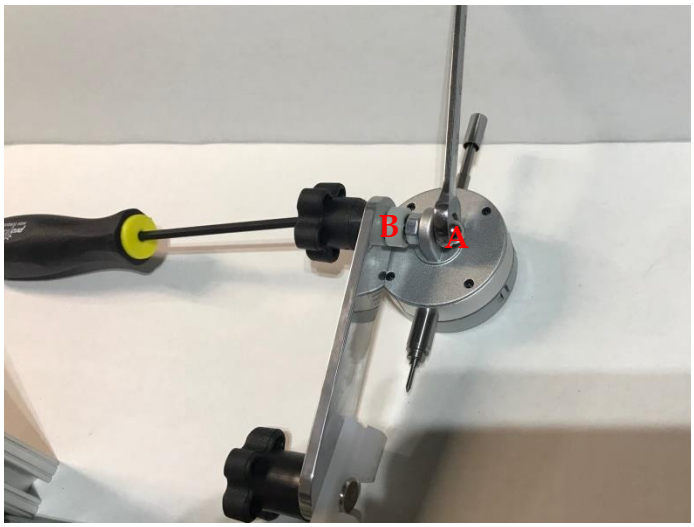




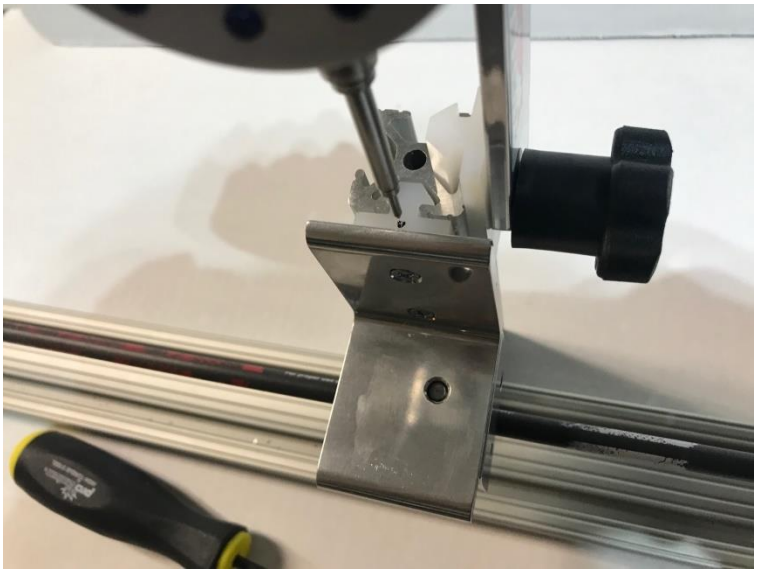
This is how your digital spine tester arrives
Note: we now use a high quality digital dial gauge.
Weight not shown in pic.



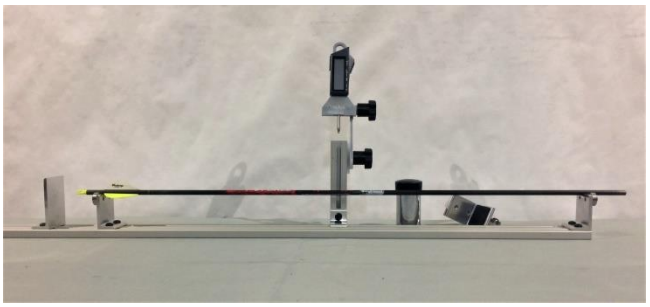
Stand up the tower.
Note the Dots on both ends and the center.
These are set at 28 inches and the one at the tower is centered at 14 inches.



Install the dial gauge in this manner.
Inside the knob is a button head cap screw **(C).** Hold the screw while you tighten the **crown nut (A).**
Do not remove the inner nut bushing or washers **(B).**



It helps to lay a shaft across the rollers.
Slide the pan into the guide and rest on the shaft.
Now slide the dial gauge assembly in place, trying to align the pointer so it is square and plumb over the dot on the plastic guide attached to the pan.



Set your machine up as seen in picture.
With the bearings at 28 inches set your shaft between them and slide the weight pan in place.

Position the gauge so the pointer sets squarely on the nylon guide then lower into position so that it is aproximatly ¼ in from the nylon guide. Turn on the gague, set to inches and push zero to reset, as shown in picture.

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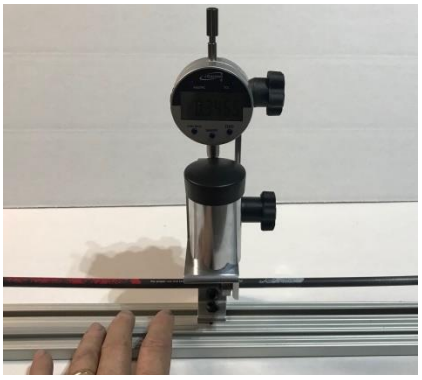
With the screen reading zero set your weight gently on the pan making sure it's close to center and all the way back



When measuring the deflection gently tap the base to fine tune your readings

Note: this new dial indicator is very accurate so a .0005 reading after zeroing is common.

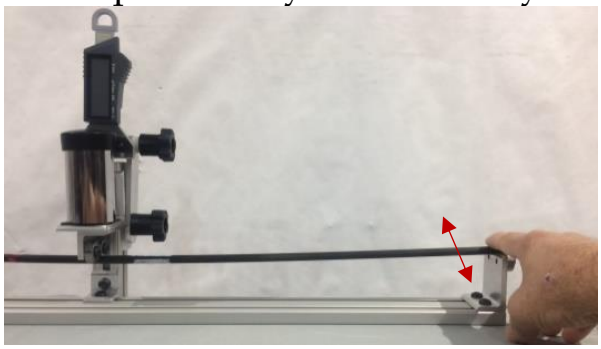
As you can see in the picture it stared out at .0005 before we added the weight. It now reads 3515. The scale reads in 1/10000ths, so that's 3515 thousandths or a 351 shaft. Measuring your deflection takes a bit of finesse, sometimes a light tap on the weight helps to get a good reading. The accuracy is about + or – 1.5%. I'd recommend scaling a shaft a few times and doing an average until you get the hang of it. There are two methods for determining the static spine. The most common is what I have just showed, 28 inches at 1.94 pounds (88 grams). But Easton uses 26 inches at 2 pounds. Now this is strictly a personal preference both methods yield the same result. If you desire to do the Easton method then remove the cap on the weight and drip solder in the hole until it's exactly 2 lbs. and reposition the bearing blocks to 26 inches.

Locating the Spine

Probably the most important thing to ensure good arrow grouping is to have the spine on the top of the shaft. And this goes double for crossbow bolts.

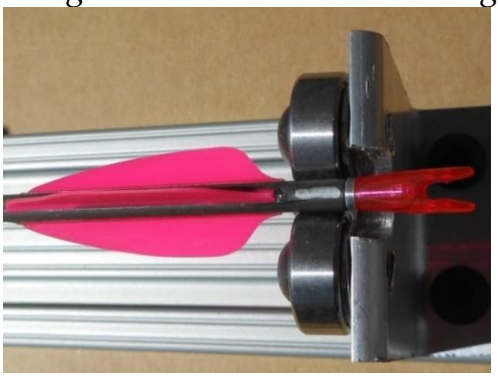
A lot of factory shafts are coming pre-spined but I have found a lot of these to be wrong. Victory puts the cock vane on the wrong side, they have it so the shaft flexes down against the rest. This is wrong! Even if you are using a drop away, the shaft it is still resting on the rest for up to a ¼ of the shaft.

To find the spine is easy. The best way is by feel.



With the weight on the pan simply roll the shaft. You will feel it roll into a valley. It's easier to apply a little more weight to the pan by pushing the weight down with your left hand and rolling the shaft with your right. The shaft will flex towards the weak side down. Rotate the shaft 180 degrees and mark the shaft with paint this is where you want the top of the shaft to be.

I recommend using the same color fletching this makes nock tuning easier if necessary. Also use the basic tri fletch pattern I have found this to be the best through extensive machine testing.



Fletch and finish your shafts and weigh. Weigh each point and adjust untill perfect. Be sure and weigh your completed arrows. **Get them perfect!**

Checking runout

Checking arrow straightness is easy. Remove the weight and pan from the machine and place your shaft between the rollers.

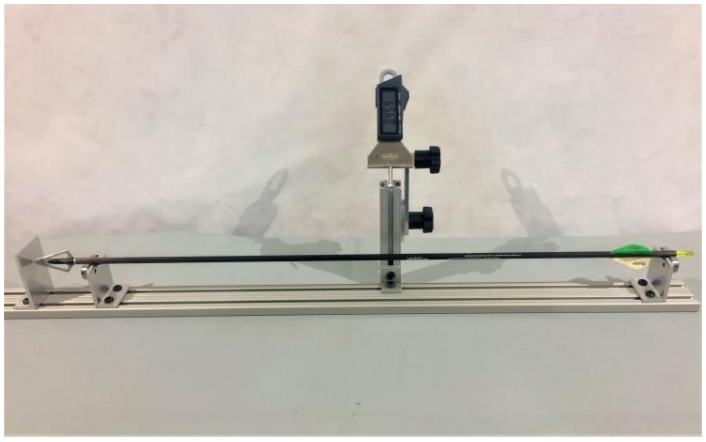
Position the gauge so it's in the center of the shaft with about a ½ inch of the pointer showing.

Zero the gauge and rotate the shaft. If the gauge shows a negative value stop it on the highest number and re-zero. This will make reading easy. Now rotate and watch.

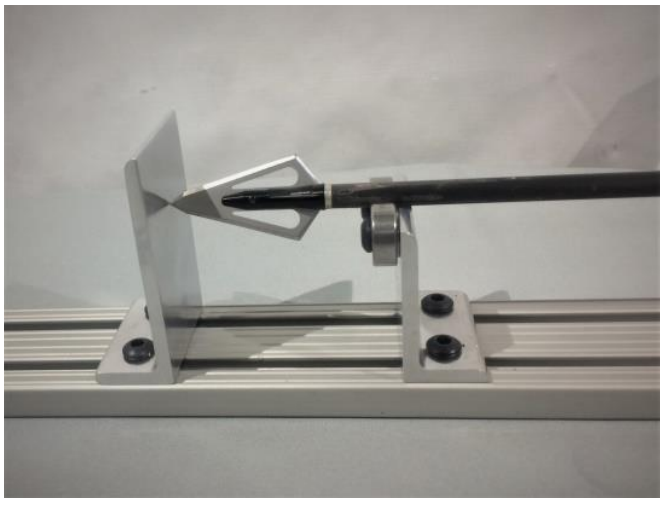
This v-6 shaft is 3/1000ths out

Checking broad heads

To use as an arrow spinner, remove the weight and pan and lock gauge up out of the way and set arrow in place as shown.



Tape a piece of paper to the target and mark the point where the shaft touches the paper. Rotate the arrow and watch for tip movement. If the point makes a circle, tweak tip until perfect.



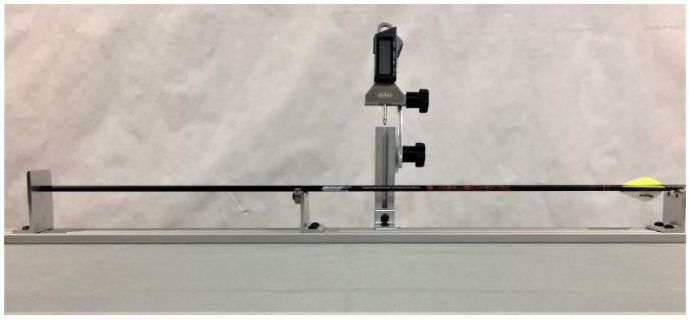
This also works great for pin nocks.

Advanced tuning

Make sure your nocks fit the string properly.
Too tight and they will pluck, giving you a shotgun effect most noticeable at longer ranges.
Too loose and they risk falling off!
Your arrows are now ready to use, or you may want to move on to the next phase of advanced tuning and shoot them through a machine to group tune. All shafts are not the same. The cheaper shafts benefit the most from machine tuning. I shoot Carbon Express Nano Pros for field and have found that group tuning at 80 yards works best after the shafts have been SPINED. I nock tune or cull any flyers and I'm good to go.

Cresting

Adding detail to your arrows is simple
Set your machine up like in the picture.



Roll the shaft with your left hand keeping the point against the target