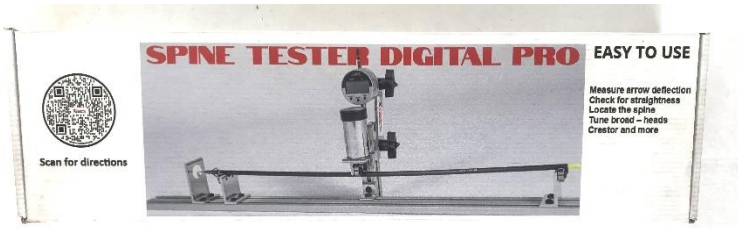
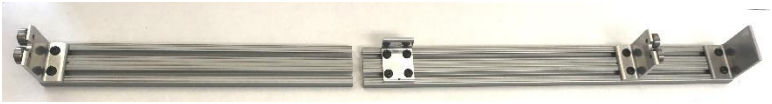
Spine-Tester Digital

For more info see

www.coopsbowsmith.com



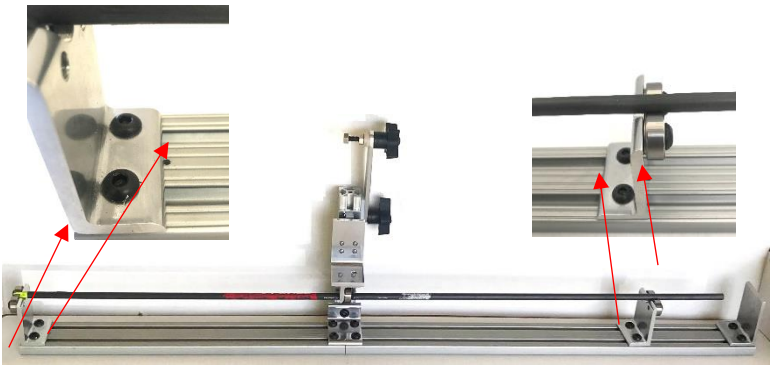
This is how your digital spine tester arrives.
All tools are supplied with order.



Butt the 2 pieces together and slide the joining plate in place.

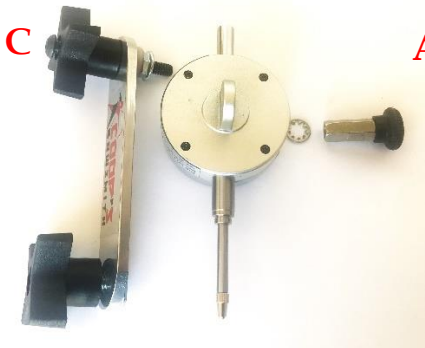
Note the center alignment hole is directly over seam and tightened in place.

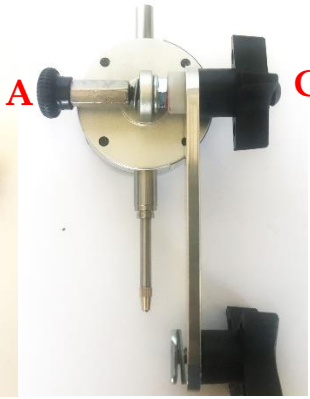
Install tower and dial gauge holder as seen in picture.
NOTE: it helps to set a shaft in place first.



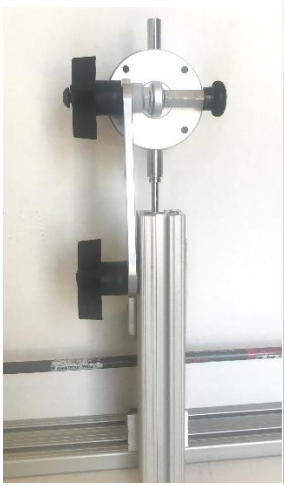
NOTE: alignment holes for 28 inch or 26 inch set up.

Standard set up for carbon and compound bows use the 28 inch 1.94 pounds (880 grams). The supplied weight is preset for this configuration.

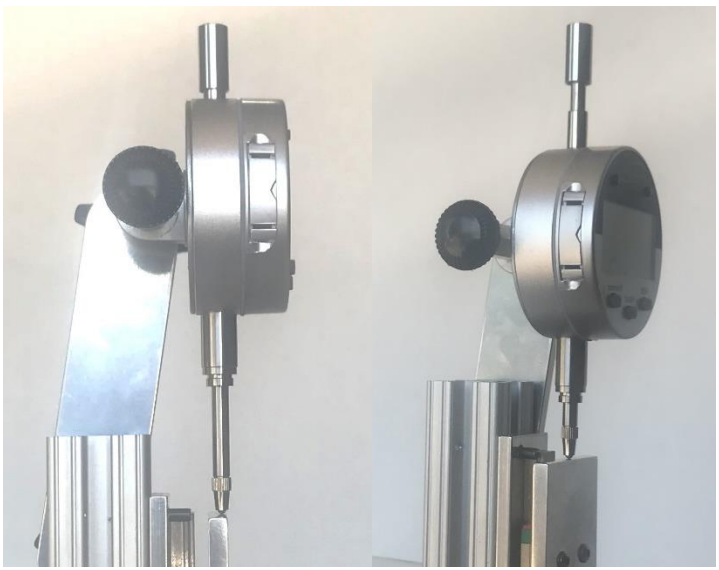




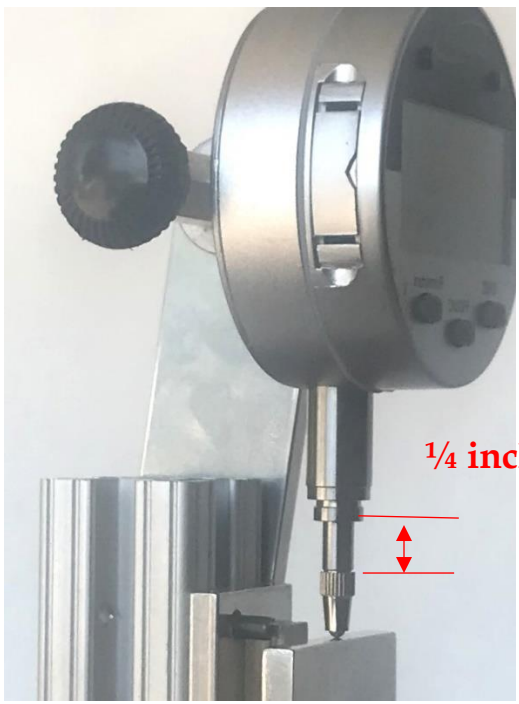
Install the dial gauge in this manner. Inside the knob is a button head cap screw **(C).** Hold the screw while you tighten the thumb screw **(A).**
Do not remove the inner nut (its Loctite), bushing or washers.



Now slide the dial gauge assembly in place, trying to align the pointer so it is square and plumb over the top edge of the pan.




Install dial
gauge in this
manner


¼ inch +-

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.

Zero the gauge - add the weight and read deflection.
Note: a couple lite taps may help to stabilize the gauge.

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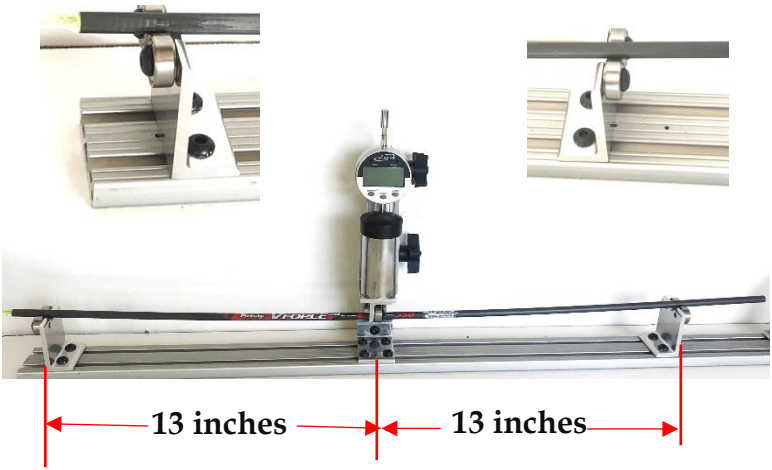
With the screen reading zero set your weight gently on the pan making sure it's close to center and all the way back and doesn't touch or interfere with gauge

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

Gently roll your shaft and watch the measurement change as you roll on and off the spine.

As you can see in the picture it started out at .0005 before we added the weight. It now reads 351. The scale reads in 1/10000ths, so that's 351 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 shown, 28 inches at 1.94 pounds (88 grams). But wooden arrows often use 26 inches at 2 pounds which with the help of a chart determines poundage for a particular shaft. Now this is strictly a personal preference and both methods yield the same result. If you desire to do the wood shaft method, then remove the cap on the weight and add 3 quarters this will make it 2 lbs. Then reposition the bearing blocks to 26 inches.

3 – Quarters
2pounds



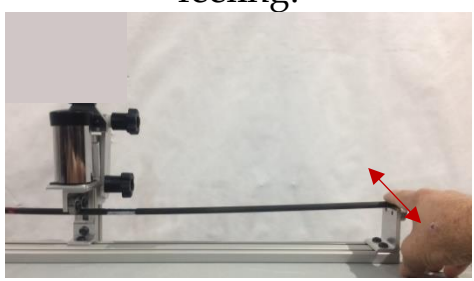
This is the proper set up to determine poundage for *wood shafts.*

Locating the Spine

Probably the most important thing to ensure good arrow grouping is to have the stiff side on the bottom 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 is still riding on the rest for up to a ¼ of the shaft.

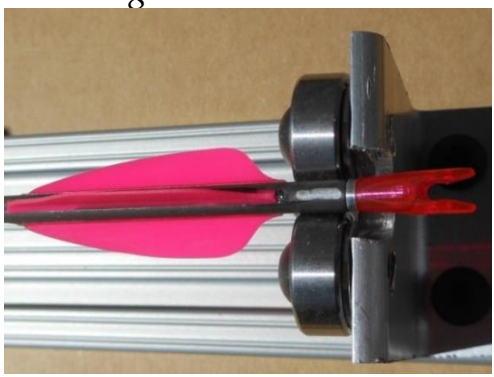
Finding the spine is easy. The best way is by feeling.



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 using the basic tri fletch pattern I have found this to be the best through extensive machine testing.



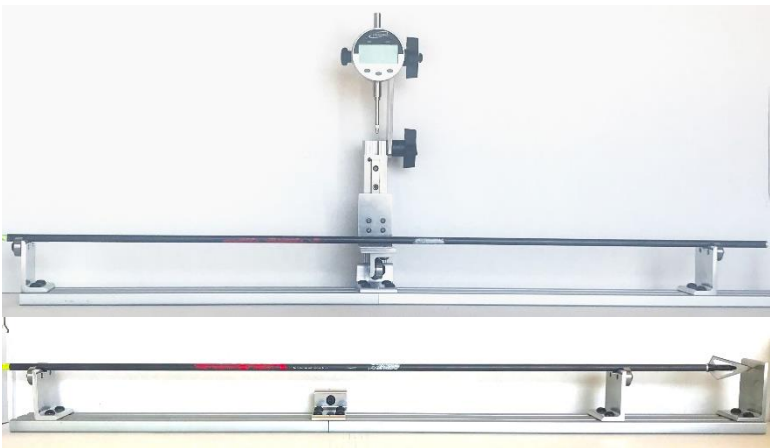
Fletch and finish your shafts and weigh each point and adjust untill perfect. Be sure and weigh your completed arrows.

Get them perfect!

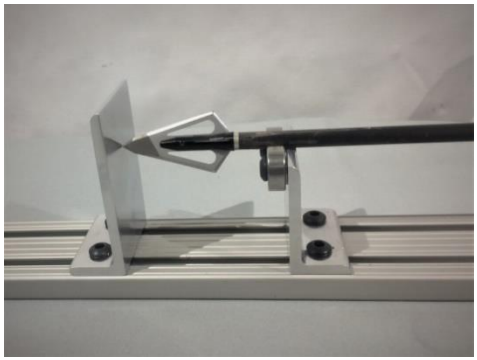
Another way is by using the dial indicator. With the weight on gently roll the shaft and watch the numers change . The lowest reading 351 is the stif side and this is the top of the shaft . the higher reading 355 would be the soft side. So mark the shaft on top at the lowest reading 351 and mark this as the top of shaft.

Checking broad heads

To use as an arrow spinner, drop the pan under the shaft or remove the tower as shown.

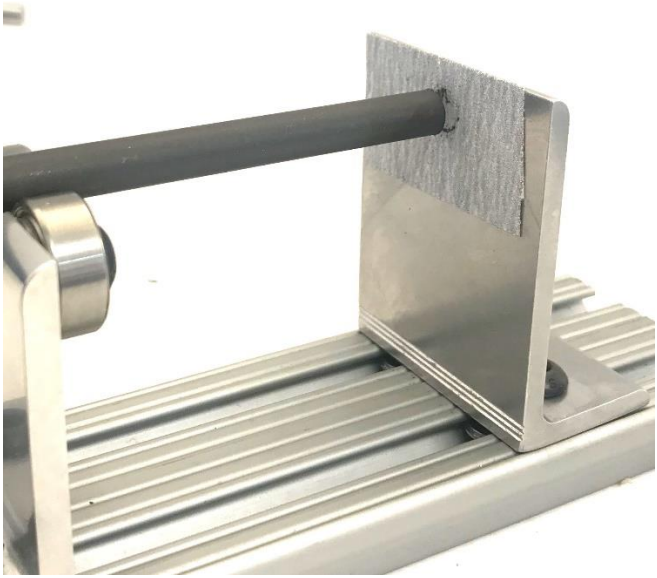


Tape a piece of paper to the target and mark the point where the shaft touches the paper. Rotate the arrow and watch for tip movement. If the point makes a circle, tweak tip until perfect.



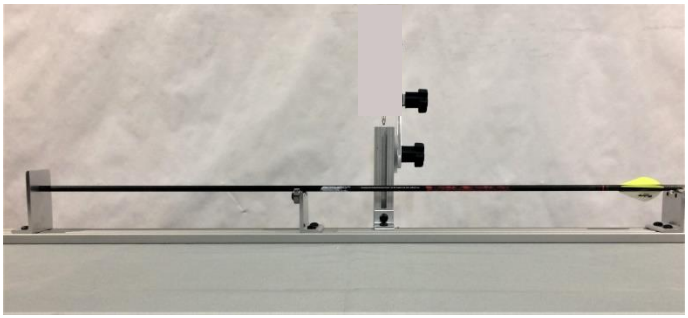
This also works great for pin nocks.

You can also use this for squaring up cut ends.
Apply some sticky back sandpaper to the back side of the target making sure it is square and gently spin to remove material.

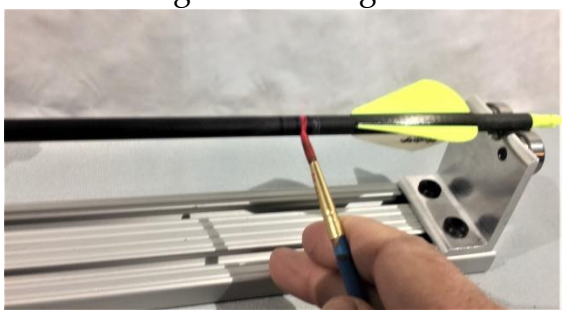


Cresting

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.



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

300 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.

What Is Arrow Spine?

Arrow spine refers to the stiffness of an arrow. You'll often find arrow spine measurements printed on the side of arrows by manufacturers. They will also usually be specified when purchasing arrows. But what do these numbers for ATA and ASTM spine actually mean?

Without knowledge of how arrow spine is measured, it's just a number and not a very useful one at that. The reason for this is that different standards measure the arrow spine in a different manner. Therefore, the following article provides a short overview of these measuring methods.

Note: Arrow spine tables are only a recommendation and sometimes the number provided by the manufacturer does not really correspond to the measured values. There are several mobile apps which provide precise information about different arrow types, including diameter, weight, and spine. Two examples for free apps are "B4 Shaft Selector" and "Arrows".

ATA, AMO, and ASTM

ATA (AMO) is the Archery Trade Association, formerly the Archery Manufacturers and Merchants Organization. When they measure the arrow spine, they record the deflection in thousandths of an inch. An arrow is attached to two supports, **26 inches** apart, and pressed in the middle with a weight of **2 pounds (907 grams)**. A deflection in the arrow of 0.4 inches gives an arrow spine of 400. The arrow spines of

wooden arrows are measured according to the ATA system.

ASTM is the American Society for Testing and Materials. In their Test Nr. F2031-05, they record the deflection in thousandths of an inch. In this test, an arrow is attached to two supports, **28 inches** apart, and pressed in the middle with a weight of **1.94 pounds (880 grams)**. The weight is smaller, but the distance between the supports is greater, which should give a similar deflection. Arrow spines of carbon fiber and aluminum shafts are specified according to the "modern" ASTM standard.

ATA and ASTM values can be converted as follows: **ATA / 0.825 = ASTM**, therefore **ASTM*0.825 = ATA**

Example: A carbon fiber shaft has an arrow spine of 500 according to ASTM (28" distance, 1.94 pounds). 500*0.825 = 413 spine according to ATA (26" distance, 2 pounds).

In other words, an ATA shaft will always be stiffer than an ASTM shaft with the same "number". Carbon fiber arrows measured with an ATA device will appear slightly "softer" than the manufacturer listed value.

Note: These values are static and relative. They relate only to the aforementioned conditions. They are a good starting point, but no silver bullet for every situation. The perfect stiffness of the arrows can depend on:

- Bow type
- Shaft material
- Arrow length (longer arrows are softer than shorter ones)
- Arrow build (weight and shape of the arrowhead, weight, and shape of the fletching, possible tapering of wooden shafts)
- Shooting technique (Mediterranean archers and thumb archers have different arrow dynamics)

Wooden arrows

Wooden arrows are usually not marked with a spine measurement. Rather, they carry the corresponding draw weight, with which they should be shot. The draw weight for an arrow with a certain deflection is calculated by dividing the ATA test distance (26 inches) with the measured deflection. If a shaft deflects at 0.900 inches, the corresponding draw

weight is 26/0.900 = 29 pounds, for a 26-inch-long arrow.

If the archer is looking for matching arrows for a certain draw weight, 26 is divided by the draw weight at full draw to calculate the desired deflection. An archer with 30 pounds at full draw requires arrows which deflect at 26/30 = 0.867 inches. However, experienced wooden arrow archers are recommended to use arrows which are **5-10 pounds "stiffer"** (26/35 = 0.743 or 26/40 = 0.650 inches). Additionally, it is recommended to add or subtract 3-5 pounds for every inch over or below 26, respectively.

The ATA/AMO table below lists deflections in inches and their corresponding spines. The matching arrow spines of carbon fiber shafts according to ASTM are also provided.

David James **|** ***Updated: September 24, 2020,*** **|** **Archery Resources**

The following chart is to determine safe arrow sizes for recurve bows only.

deflection in inches	Corresponding draw weight in pounds at 28 inches of draw	Corresponding ASTM arrow spine	Deflection in inches	Corresponding draw weight in pounds at 28 inches of draw	Corresponding ASTM arrow spine
1,300	20	1576	0,426	61	516
1,248	21	1513	0,420	62	509
1,196	22	1450	0,413	63	501
1,144	23	1387	0,407	64	493
1,092	24	1324	0,400	65	485
1,040	25	1261	0,394	66	478
1,005	26	1218	0,388	67	470
0,971	27	1177	0,383	68	464
0,936	28	1135	0,377	69	457
0,902	29	1093	0,371	70	450
0,867	30	1051	0,366	71	444
0,842	31	1021	0,361	72	438
0,817	32	990	0,357	73	433
0,793	33	961	0,352	74	427
0,768	34	931	0,347	75	421
0,743	35	901	0,343	76	416
0,724	36	878	0,338	77	410
0,706	37	856	0,334	78	405
0,688	38	834	0,329	79	399
0,669	39	811	0,325	80	394
0,650	40	788	0,321	81	389
0,636	41	771	0,317	82	384
0,621	42	753	0,314	83	381

deflection in inches	Corresponding draw weight in pounds at 28 inches of draw	Corresponding ASTM arrow spine	Deflection in inches	Corresponding draw weight in pounds at 28 inches of draw	Corresponding ASTM arrow spine
0,607	43	736	0,310	84	376
0,592	44	718	0,306	85	371
0,578	45	701	0,303	86	367
0,566	46	686	0,299	87	362
0,555	47	673	0,296	88	359
0,543	48	658	0,292	89	354
0,532	49	645	0,289	90	350
0,520	50	630	0,286	91	347
0,511	51	619	0,283	92	343
0,501	52	607	0,280	93	339
0,492	53	596	0,277	94	336
0,482	54	584	0,274	95	332
0,473	55	573			
0,465	56	564			
0,457	57	554			
0,449	58	544			
0,441	59	535			
0,433	60	525			