Tuning and Carbon Arrows

Article courtesy Spot-Hogg Archery

Carbon arrows have been available for quite a while, but traditionally have not been real consistent from arrow to arrow. At twenty yards, a dozen arrows would group in a hole varying from quarter to softball size. This was discovered with our shooting machine and several different brands of arrows.

We like the non-bending characteristics of the carbon arrows, but when given the choice we prefer to have arrows that group in a hole the size of a dime at twenty yards, and a quarter at sixty yards. What seemed to work the best was a marriage of carbon and aluminum. The arrows with the carbon wrapped around an inner core of aluminum, have the straightness and consistency of aluminum with the carbon providing a resistance to permanent bending. With persistence and patience, they can be straightened should they get a little bent.

These types of carbon wrapped arrows do not come in fat shaft sizes. So when using fat shafts, we opted for the aluminum arrows (straight aluminum arrows group very well). However, it seems that no matter how careful you are, the aluminum arrows get bent (bent aluminum arrows do not group well at all). We figured that if we could get some fat shaft carbon arrows to group well, we could eliminate a problem.

So, we assembled some indoor fat shaft carbon arrows and shot them with our shooting machine. We got a grouping about the size of a golf ball. After turning nocks to index on another vane and subtle variations of just how the nocks aligned to the vanes, we got a grouping about the size of a penny.

Upon checking the arrows before each tournament, they did not always group the same as before. However, slight changes in how the nock aligned to the vanes would bring the penny size grouping back (easier than straightening arrows). Strangely, sometimes just rotating the nock a quarter of a turn and then back to where it was caused an arrow to come back into the penny size grouping. But overall the carbons stayed much more consistent from week to week.

The fat shafted carbon arrows worked so well that we decided to try some other carbon arrows. We got some carbon arrows that are advertised to be straight within +-.001 (arrow straightness really does matter). We assembled six and shot them for grouping on the machine. The grouping started at about six inches in diameter. Then by twisting the nocks, we got them grouping at about three inches in diameter.

In the past, we would have stopped right there and went back to the aluminum/carbon/composite arrows. Instead, we decided to see what the bare shafts would do.

One bare shaft flew great, the others were not so good. At twenty yards, the bare shaft group was about eight inches in diameter. Then we started rotating the nocks in the shafts.

First, we would rotate the nock 180 degrees (1/2 turn) and shoot the arrow again with the same side of the arrow up. If we got different results then we knew the nock might be bad. On some of the arrows we replaced the nock, and still could not get the arrow to hit in the same hole even when we rotated the nock 180 degrees. Secondly, we rotated the nocks 90 degrees (1/4 turn)

so that what had been the top of the shaft was now the side of the shaft and shot them again. They all hit in very different places.

In fact, as we continued rotating the nocks in 90 degree increments and shooting the bare shafts, the impact points would vary with each nock orientation. It would repeat in the same hole if you did not rotate the nock. As the different nock orientations were tried, the impact point on the target moved left and right with some variations up and down. Some of the shafts had larger differences in impact than other shafts. With the worst variation being about eight inches and the least being about three inches. Sometimes, as little as one sixteenth of a complete rotation would move the impact point an inch at twenty yards.

We decided to twist nocks and try to get all our bare shafts hitting the same hole at 20 yards. (We picked a hole that seemed to cause the bare shafts to fly their straightest.) We were able to get all the arrows but one to hit in a one-inch group at twenty yards. We were twisting our nocks sometimes in one sixteenth of a complete rotation to get them to come in. Then we fletched the bare shafts so that the nock was properly oriented straight out of the fletching jig.

These fletched arrows grouped in a hole the size of a penny at twenty yards except for the one that as a bare shaft would not group in the one-inch hole (it was about ¼ of an inch above the group). We tried these arrows on a different bow of about the same poundage, but different nock travel and got the same grouping. (This needs further investigation.)

We stripped the vanes from the first six arrows, shot the bare shafts, rotated the nocks until they all grouped in about a one-inch hole, and fletched them. Overall, we got one shaft that insisted on being two-inches from the group, nine that would group in a hole the size of a penny and the last two are out of the penny size group by about ¼ of an inch. Making eleven arrows that hit about the size of a quarter.

We used a 60 lbs. / 65% let-off bow, with string loop and 27 inch draw length. The nock travel for that bow was not the best. The up and down nock travel was pretty good, but left and right travel (string oscillations) was more than we like. The carbon arrows had 100 grain points and weighed 310 grains. With 3” helical vanes, they left the bow over a fall-away arrow rest at 277 feet per second.

So far we have tried this bare shaft tuning on three different bows with different brands of carbon arrows. Nevertheless, the results are the same. The shooters of the carbon arrows like the way the arrows are grouping and the extra speed. We are going to try this some more with different bows and different brands of carbon arrows.

Our conclusion is that carbon arrows seem to have a variance in their spine (stiffness) and/or straightness. By shooting the arrows as bare shafts it is possible to find a shaft-to-nock orientation for each shaft so they will group well. If the arrows are fletched without taking into account the variations in straightness and spine of carbon arrows, a lot of luck is needed to be able to hit where you are aiming.