

Making Arrows

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Many archers enjoy making their own arrows because it allows them to exercise personal quality control, add special features, personalize the arrows in other ways or add to their shooting enjoyment. Making arrows involves several steps, but it is not difficult. High quality arrows can be made with care and attention to detail.

Shaft Selection

The first step is selecting the shaft type and size desired. Arrow shafts are available in wood, fiberglass, graphite, aluminum and graphite-aluminum combinations.

Wood shafts are traditional. Historically they have been fairly inexpensive, but quality shafts may be difficult to find. Finding shafts that match in spine and weight can be a challenge, and keeping them straight can be an even greater one. American Indians used several hardwoods for shafts. The most common material is Port Orford cedar. Some wooden shafts, like Forgewood shafts, are compressed to reduce their diameter without sacrificing strength. Bow hunters seeking very large game sometimes insert a compressed wood shaft in another type of arrow shaft to

increase arrow mass. Wooden shafts must be lacquered or painted full length to protect them from moisture.

Fiberglass shafts are lighter than wooden shafts of the same spine weight. They remain relatively straight, and they can be matched in spine and arrow mass much better than wooden shafts. Although fiberglass is a tough material, these shafts are subject to splitting on impact. They also tend to shatter or splinter if struck along their length. Shafts with internal damage may even shatter during a release. Fiberglass has been an excellent arrow material for beginning archers, combining toughness, durability and reasonable consistency with modest cost. However, fiberglass shaft material has become much more difficult to obtain.

Another composite material used in arrow production uses graphite fibers for its strength. Graphite (carbon) is much stiffer than fiberglass (silica) even though it is lighter in weight, which results in a thinner, lighter arrow for any given spine. Graphite fibers are also more expensive than glass fibers. Arrow manufacturers recently recommended that graphite not be used for hunting arrows unless care was taken to remove all meat that might have

been exposed to the graphite fibers. Those fibers are hard, stiff and fine. They survive cooking well and can cause injury if swallowed. Many target archers, particularly those shooting bows equipped with overdraws, prefer graphite shafts.

Aluminum shafts have been the standard of both target archers and bowhunters for many years. The shafts can be made to very close tolerances in a variety of alloys, offering easy matching in spine and weight. Aluminum shaft materials may be obtained in inexpensive soft alloys that are easily bent or straightened, or very hard ones that are durable but hard to straighten and expensive. The range of materials makes finding an optimum shaft material for your shooting application possible. Aluminum-graphite combinations combine features of both materials.

Arrows must be matched in mass and spine, and they must be straight to allow accurate and precise shooting. Shaft manufacturers and archery supply houses provide graphs or tables to assist the shooter in selecting the proper shafts for his or her bow and shooting purpose. In most cases, any

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given draw weight and length will have a range of sizes suggested. Most target archers can use the lightest shaft that will fly well in their bows. Bowhunters are often wiser to select a shaft on the stiff side. The heavier, more massive heads used in bowhunting tend to “soften” shaft behavior. Consider your personal experience with your bow and tuning when selecting the proper shaft.

Cutting to Length

Once the shaft type is selected, the shafts must be cut to the appropriate length. Extra length may be helpful for young people, but it adds arrow mass and softens the spine of the shaft; this results in reduced arrow speed, greater drop at any given distance and higher trajectories. Errors in distance estimation become more critical with slower arrows. Missing high or low is a greater problem for archers using them.

Wooden shafts may be manufactured full length, then cut to length and tapered just before the arrowhead is attached. Other types of shafts are cut to length before the arrow is made. Cutting requires use of an abrasive cutoff wheel. Home cutting is not recommended without proper tools, because some techniques alter the diameter, shape or character of the shaft around the cut end.

Target archers usually cut their shafts to true draw length. The base of the head reaches the rest at full draw. For young people and beginning archers, draw length changes over time. Cutting to true draw length gives maximum performance, but it may result in arrows that are “out-grown” in a short time span.

Hunting archers and many field archers cut their shafts a little longer. The broadhead needs to clear the back of the bow, the archer’s hand or the rest on the overdraw. Usually an allowance of about two centimeters (3/4 inch) is added to the length. This compensates for overdrawing the shaft when the shooter is excited.

Specify the draw length or cut length of the arrows when ordering shafts. Draw length is measured from the bottom of the string notch in the nock. One of the best ways to measure draw length is with a draw-check arrow in a light bow. Draw to your anchor and have a friend note the true draw or the distance to the face of the bow or the rests on the overdraw. Once that distance is known, determine the length the shafts should be cut. Be sure the person cutting the shafts de-burrs them when they are cut.

Attaching the Inserts

Wooden shafts are tapered with a cutting tool resembling a hand pencil sharpener to receive the nock and the point. Other shafts are tubular. They use inserts or built-in tapers for the nock and the point. Some types of inserts have screw-in adapters that accept several types of points.

The type of shaft material influences the way the inserts are fixed in place. Melttable adhesives, like ferrule cement, are usually used on aluminum shafts. The cement forms a solid bond that is slightly flexible and durable. It is applied by melting a small amount of adhesive on the insert, warming the end of the shaft and pushing the insert into the shaft with a twisting motion. The insert needs

to be held in place until the adhesive sets or cools. If screw-in adapters are used, a precaution should be used to prevent glue from getting into the threads. Apply a liberal amount of petroleum jelly to the threads of a broadhead (without blades) or a field point. Screw the head into the adapter, being careful not to get the petroleum jelly on the outside of the adapter. Then attach the insert as described above. An added advantage of having the head screwed into the adapter is the ability to check the alignment of the adapter in the shaft. Spin the arrow on its point. If it wobbles, re-heat the adapter area and adjust it until it spins true.

Composite shafts may have adapters at both ends. Most archers prefer to use epoxy adhesives to attach the inserts. The epoxy is mixed according to manufacturers instructions. It is applied to the body of the insert and inserted into the body of the shaft with a pushing and twisting motion. If screw-in adapters are used, the precautions outlined above to prevent fouling the threads with glue should be followed. Be sure to use the appropriate adapters in each end of the shaft.

Cleaning and Preparing the Shaft

Spending a little time and effort preparing the shaft before applying the fletching

can pay great dividends in durability. Most adhesive manufacturers encourage applying a base of lacquer to aid in the bonding process. A clean surface is essential for good adhesion by the lacquer base.

Lacquer manufacturers supply instructions on preparing the shafts for good adhesion. Metal shafts may be scrubbed with a milk cleanser, rinsed and dried. They can also be cleaned with a lacquer thinner or lacquer remover and rubbed dry. Composite shafts can be scrubbed with a cleanser and rinsed, washed with alcohol or otherwise prepared as instructed by the manufacturer. Care taken with the cleaning pays off over the life of the shaft.

If the shafts are going to be dipped full length, they may be dipped as soon as they are completely dry. If they are going to be dipped only partially, each shaft should be lightly marked with a pencil at the end of the dipped area. Lacquer is best applied by dipping the shafts one at a time into a tube filled with the desired lacquer. If you want to keep the natural color of the shafts, use a clear lacquer instead of a colored lacquer if you prefer. After the arrows have been dipped, allow them to drip for a moment to remove the excess lacquer. Hang them by their tips in a clean, well-ventilated place to cure. The lacquer is extremely durable, so make sure the floor and other surfaces are protected. Once the arrows have dried completely, they are ready to finish.

Applying the Nock

Nocks come in several styles, and the choice is primarily a matter of preference. The nocks may fit rather

loosely, or they may snap onto the string. Snap-on nocks are available from several manufacturers in several styles. All nocks come in a variety of sizes. Shaft manufacturers specify the proper nock size for their shafts.

Before the nock is applied, the nock insert or nock taper must be cleaned thoroughly. Excess adhesive or lacquer should be removed by scraping or with a small piece of sandpaper. Use a rotating motion to avoid making flat spots or irregularities in the nock taper.

Place a drop of fletching cement on the tip of the nock taper. Turn the shaft to spread the glue around the taper. Attach the nock with a twisting motion, much like placing a nut on a bolt. The nock must be aligned with the shaft for best shooting results, so care in placing it is essential. Some serious hunters and target shooters use a jig to ensure proper nock alignment.

Set the shaft aside for a few minutes to let the adhesive set. By the time a dozen nocks have been applied, the first one will be set up firmly enough to allow the fletching to be applied.

Applying the Fletching

Selection of fletching material is a matter of both personal preference and use. Feathers offer more control. In archer's jargon, they are more forgiving. They hiss in flight, are affected by inclement weather and tend to slow the shaft's flight more than the plastic vanes. Feathers are also the traditional fletching material. Soft plastic vanes yield more arrow speed but at the cost of some control. They are more durable and weather resistant

than feathers. Several specialized types of vanes are available to the target shooter.

Many target shooters use feathers indoors and vanes outdoors.

The use of the arrow dictates the amount of fletching needed for stability. Light target arrows can be shot with only three small vanes for guidance. Heavy broadhead hunting arrows may require three or four much larger vanes to achieve the same amount of stability. Flight arrows have very small amounts of fletching. On the other end of the spectrum, there are arrows designed for limited flight. Flu-flu arrows use massive amounts of fletching, six full-length feathers for example, to slow the arrow rapidly after a short flight.

The fletching style represents a compromise. Straight fletching, with the vanes aligned with the shaft gives less control and more speed than those types that impart more spin to the shaft in flight. Some archers like to angle the vanes slightly to give the shaft additional spin. Others prefer a helical fletch to give the shaft a higher spinning rate, accepting the sacrifice in speed for the extra control. Whether three or four vanes are used is largely a matter of preference. Archers argue over the merits of fletching styles. Experiment to determine your own preferences.

With plastic vanes, selecting a right or left helical or off-set fletching pattern is a matter of preference and string or cable clearance. When feathers are

used, the direction of the offset or spiral must match the curvature of the wing. For example, left helical or left off-set fletch requires use of feathers from the left wing.

Plastic vanes are bought cut to shape. Feathers may be purchased in that condition, but they may be applied full height. Unless the height is desired to slow the arrow, those feathers must be die-cut or burned to length. Most are burned with a hot wire to the shape desired. Most feathers are cut or burned in shield or parabolic shapes. Availability, control, noise in flight and personal preference are involved in selecting a feather shaped. The best shape remains a matter of debate. The fletching should be applied using a properly set-up fletching jig. Each vane should be the same distance from the nock and they should be positioned precisely. The vane should be cleaned before it is used and be held firmly in place until the bead of fletching cement has dried. After all the fletching has been applied to an arrow, a tiny spot of fletching cement should be applied to the leading and trailing edges of each vane.

Customizing Your Arrows

Many archers like to apply a crest or signature to their arrows as a personal symbol. They identify their arrows when several people are shooting at the same target or in other situations where identification is needed. Sometimes archers add decals or individual markings to each arrow, so it can be distinguished from others in the set. That permits individual evaluation. If one shaft tends to give erratic flight or consistently poorer flight, it can be checked for alignment or straightness. Cresting is a series of lacquer bands. It is applied with brushes while the shaft rotates in a cresting lathe. The lathe has a collet or receiver that holds the nock and one or more padded rests on which the arrow rotates. Usually it includes a series of pins or markers that can be set to ensure uniform application of the stripes. Lighter colors should be applied as a base coat, with darker ones covering them. Try several designs on a junked shaft before deciding on one that pleases you. A few archers go one step further and add a minute “crest” at the base of the nock. Many of today’s archers dispense with the crest completely. You decide how you want to have your arrows look.

Attaching the Point

If screw-in adapters were used, the point of choice could simply be

screwed into the adapter to finish the shaft. If other inserts were selected, the points need to be attached with ferrule cement. Those points are attached using the same procedure as in attaching the inserts of aluminum shafts. Heat the insert and the point. Apply a small amount of ferrule cement to the insert and rotate the shaft while heating the insert to spread the cement evenly around the taper. Using a twisting motion, seat the point fully on the taper of the insert. Check it for alignment by spinning the shaft on the point and watching for any wobble in the spinning shaft. If the point is true, allow it to cool and remove any excess ferrule cement from the base of the ferrule. If it is not, re-heat the point and adjust it.

Making arrows takes some time and attention to detail. It can add to your enjoyment as an archer. Try making your own to see you want to be involved with this part of archery.