

## **Make Your Own Wooden Arrows – By Mike Burke**

This is just my way of doing things and I do not claim this to be a definitive guide, use it as you see fit.

As you are reading this already, I am not going to go into why you want to make wooden arrows. When I started archery, I started with aluminium arrows and then moved to carbon. Once I got the 'traditional shooting' bug I started making wooden arrows and have not looked back. Until you have shot a wooden arrow that you made yourself, it is difficult to describe the satisfaction you get from every shot (OK as long as you hit the target). Before you go down the route of making wooden arrows you need to accept that you will break a number of arrows (it's inevitable!), wooden arrows are far more flimsy than aluminium or carbon and do break. My advice is always to make in batches of 12 so you have some spares, should you break a couple.

### **Why Make Your Own Arrows**

There are a number of reasons for making your own arrows:

**Economics:** It's cheaper to make your own arrows than buy them pre-made. A set of 12 standard arrows from an archery shop will set you back about £75, where you can buy the components for £50. There are however a number of one off costs that you will incur on your first set of arrows, such as a fletching jig.

**Quality:** The arrows you make will be the same quality or probably better than the ones you buy and finished the way you want them.

**Satisfaction:** Maybe I should have placed this first in the list! There is an immense deal of satisfaction in knowing that you made the arrows and that you have learnt a new skill. If you are like me you will be constantly thinking of ways you could improve your arrows.

### **What you need to make arrows:**

- Shafts
- Points/Piles
- Feathers
- Nocks
- (Wraps)
- Glue/Fletching Tape

## Equipment you will need:

- Fine Saw (to cut the shafts to length) – I use a Dozuki Saw (a Japanese saw used in furniture making), however a junior hacksaw will do.
- Tapering Tool
- Fletching Jig

## Components

### Shafts

Shafts are available in a number of diameters, with the two most common being 5/16 and 11/32. They tend to be 32 inches long and need to be cut to the correct length. The shafts generally come from Port Orford Cedar (POC), Pine or Spruce trees. There are other woods, such as Bamboo (OK well it is really a type of grass!), but I will only cover the three main types of wood. POC is generally seen as the best shaft material and is slightly more expensive than the others but other people swear by Spruce or Pine. There are many debates on the merits of each wood, Archerytalk ([www.archerytalk.com](http://www.archerytalk.com)) have many forums on the merits of each. I have used German Spruce and POC and I still can't decide which I like the most.

**5/16:** These are one of the most common shafts available. There are a wide range of nocks and piles to fit them and are available in a spine range to match bows with a 20-45lbs pull weight.

**11/32:** These are slightly thicker shafts than the 5/16 and are generally used for stronger bows. There are a wide range of accessories available and spine ratings go from 40-65lbs. Despite only being slightly thicker they seem a bit tougher and less flimsy than the 5/16 version.

**3/8:** This is the British Longbow Society "Standard Arrow" and is used for the society shoots with heavyweight bows. A 32/64 shaft also exists for use with very heavyweight bows.

### Feathers

Feathers have the function to form the control surfaces for the arrow. The general rule is to put them as far back along the shaft as possible to maximise the influence on the flight of the arrow. You should allow room so it is comfortable between the end of the fletch, when the arrow is placed on the bow string and allow you to get your fingers round the string. I generally have 0.4" which is approximately 1 cm and allows enough room for me to mark each arrow with red/white/blue 1 cm insulating tape (matched to the peg colours for field shooting).

Feather fletching come in sizes from 2"-5", left wing or right wing and shaped in either shield or parabolic form.

**Feather Length:** The larger the fletch, the greater the drag but at the same time the greater the length, the greater the stability. There is a balance between stability and drag that I will deal with later on.

**Left or Right Wing:** Left wing feathers come from the left wing of a bird and vice versa. If you are fletching straight it doesn't matter which wing (as long as you don't mix them). Feathers can be fletched to make the arrow spin in flight by using a helical clamp. This increases the drag, but at the same time improves the accuracy by causing the arrow to spin. The only rule is that a right helical clamp should use a right wing feather and a left helical clamp should use a left wing. There are no rules whether left or right spin is better, it's personal preference and they will both work with left handed and right handed bows.

**Shield or Parabolic Feather:** This is purely down to personal preference again, the only rule is not to mix them. I use shield as I prefer the shape.

## Nocks

There is no hard and fast rule with nocks other than the fact that they need to be matched to the size of the shaft. Some of the nocks 'grip' the bowstring more than others, this comes down to personal choice. When you buy nocks speak to the shop and tell them what string you are using and they will be able to help. I have always used index nocks, which have a small ridge on one side, which helps in lining up the cock feather when fletching the arrows. I prefer fluorescent colours as they show up better in low light, but the choice is yours.

**TIP:** Paint the part of the arrow you glue the knock on white and it will show up better when using clear fluorescent knocks.

If you want to go further down the traditional/primitive route you can buy pre-carved wooden or bone nocks or self nock by cutting them into the arrow yourself (Bearpaw Nifty Nocker improves accuracy when cutting).

## Piles/Points

There are a bewildering range of piles/points available in multiple weights and this can be very confusing. What it really comes down to is personal preference.

Steel points tend to be field points:



Brass points tend to be bullet type points:



They come in tapered, parallel or tapered screw. For your first set of arrows my recommendation would be to use screw-on points and make sure they are glued on as well (either with hot melt glue or epoxy).

TIP: Put your points on before shortening the shaft to your draw length, you will still have some room to play with if you get it wrong.

If you need to take piles off a shaft, just heat the point and unscrew (this works for epoxy as well as hot melt).

Many archery clubs only allow wooden arrows to be shot at straw roundels as it is easy for piles to come off and these can damage other archers' arrows. There is a different type of pile called a T-Tip. The premise is that these glue into a hole drilled in the end of a shaft, make them much less likely to come out. They are almost double the price of normal points, but are significantly more robust. You also need the arrow-fix tool to accurately drill in the centre of the shaft.



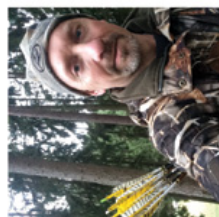
## Arrow Spine.

The "Spine" of an arrow is simply a measure of its bendability. Arrows should be matched to the weight you are pulling, at your draw length, on your bow (not your bow pull weight). There is a relationship between diameter, personal pull weight, length of arrow, spine and pile weight (and feather length). Shortening an arrow will reduce the bendability as will putting on a lighter pile. Conversely a longer arrow or one with a heavier pile will increase the bendability.

Arrows are weighed in a measure called grains, which originates from the weight of one grain of wheat (1 grain = 0.065g). Most shops will sell you a set of shafts that can vary by up to 100 grains. Some shops will match arrows If

There are a number of charts to help you set up your arrows – I use the Henry Bodnik chart: (<http://www.bearpaw-blog.com/wp-content/uploads/2015/07/henrys-spinetable-woodenshafts.jpg>)

## HENRY BODNIK'S SPINE TABLE FOR WOODEN SHAFTS



lbs/Finger	Arrow Length 26 inches		Arrow Length 27 inches		Arrow Length 28 inches		Arrow Length 29 inches		Arrow Length 30 inches		Arrow Length 31 inches		Arrow Length 32 inches	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F
-30 lbs	1 5/16, -30	3	1 5/16, -30	3	2 5/16, 30 - 35	3	2 5/16, 35 - 40	4	2 5/16, 40 - 45	4	2 5/16, 45 - 50	4	3 11/32, 45 - 50	5
30 - 35 lbs	1 5/16, 30 - 35	3	2 5/16, 30 - 35	3	3 5/16, 35 - 40	4	3 5/16, 40 - 45	4	4 1/32, 45 - 50	4	4 1/32, 50 - 55	4	4 1/32, 50 - 55	5
36 - 40 lbs	2 5/16, 35 - 40	4	2 5/16, 35 - 40	4	3 11/32, 40 - 45	4	3 11/32, 45 - 50	4	4 1/32, 50 - 55	4	4 1/32, 55 - 60	4	4 11/32, 60 - 65	5
41 - 45 lbs	3 5/16, 40 - 45	4	3 11/32, 40 - 45	4	3 11/32, 50 - 55	4	3 11/32, 50 - 55	4	4 1/32, 55 - 60	4	4 11/32, 60 - 65	4	4 11/32, 65 - 70	5
46 - 50 lbs	3 11/32, 45 - 50	4	3 11/32, 45 - 50	4	3 11/32, 50 - 55	4	4 1/32, 55 - 60	5	4 1/32, 60 - 65	5	4 11/32, 65 - 70	5	4 11/32, 75 - 80	5
50 - 55 lbs	4 11/32, 50 - 55	5	4 11/32, 50 - 55	5	4 11/32, 55 - 60	5	4 11/32, 60 - 65	5	4 11/32, 65 - 70	5	4 11/32, 70 - 75	5	4 11/32, 75 - 80	5
55 - 60 lbs	4 11/32, 55 - 60	5	4 11/32, 55 - 60	5	4 11/32, 60 - 65	5	4 11/32, 65 - 70	5	4 11/32, 70 - 75	5	4 11/32, 75 - 80	5	4 11/32, 80 - 85	5
60 - 65 lbs	4 11/32, 60 - 65	5	4 11/32, 60 - 65	5	4 11/32, 65 - 70	5	4 11/32, 70 - 75	5	4 11/32, 75 - 80	5	4 11/32, 80 - 85	5	4 11/32, 85 - 90	5

### Length of Fletches Application and Calculation of Spine Values

Weight	Length	Number
30 grs.	3 inches	1
70 grs.	4 inches	2
100 grs.	5 inches	3
125 grs.		4

The above table works for high-performance longbows with a Whisper String (Fast Flight, Spectra, Dynaflyght, Exel)

For longbows with a Dacron string, 5 lbs must be subtracted from the factual draw weight.

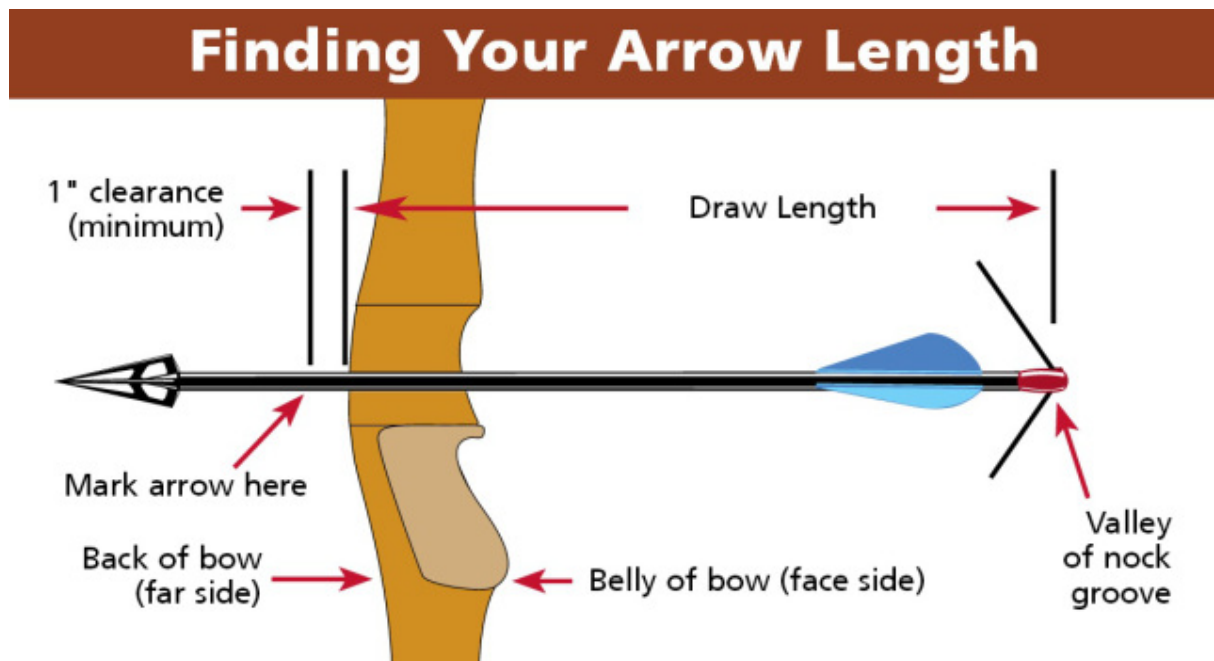
For recurve bows with a Whisper String (Fast Flight, Spectra, Dynafight Exel etc.) 4 lbs must be added to the factual draw weight.

For bows made from pure wood and glass-laminated bows without a bow saddle, 5 lbs must be subtracted from the factual draw weight.

## Making a set of arrows

To make a set of shafts you will need to buy, shafts, points, feather fletches and nocks. As I have said before there is a relationship between arrow length, arrow diameter, draw weight, point weight and fletch length.

**Arrow length:** With wooden arrows there is no need to exactly match arrow length to draw length, a 1-2" overhang is fine and in fact I would recommend this as it allows enough length for you to put a new point on the arrow if it breaks, which normally happens just behind the point (as long as you don't mind a shorter arrow).



**Point/Fletch Length:** Once you know the length of arrow you want to make you will need to find out you draw weight at your draw length, most clubs have a digital bow scale so you can work this out.

Example: Recurve bow (with fast flight string), 29 inch shaft and a finger weight of 44lbs: Use the table for a 29 inch arrow and then remembering that you have to add 4 lbs for a recurve bow ( $44+4 = 48$ ). Go down until you come to 48 lbs (46-50 lbs weight).

lbs/Finger	P	Arrow Length 26 inches	F	P	Arrow Length 27 inches	F	P	Arrow Length 28 inches	F	P	Arrow Length 29 inches	F	P	Arrow Length 30 inches	F	P	Arrow Length 31 inches	F	P	Arrow Length 32 inches	F
-30 lbs	1	5/16, - 30	3	1	5/16, - 30	3	2	5/16, 30 - 35	3	2	5/16, 35 - 40	4	2	11/32, 40 - 45	4	3	11/32, 45 - 50	4	3	11/32, 45 - 50	5
30 - 35 lbs	1	5/16, 30 - 35	3	2	5/16, 30 - 35	3	3	5/16, 35 - 40	4	2	11/32, 40 - 45	4	3	11/32, 45 - 50	4	3	11/32, 50 - 55	4	3	11/32, 50 - 55	5
36 - 40 lbs	2	5/16, 35 - 40	4	2	5/16, 35 - 40	4	3	11/32, 40 - 45	4	3	11/32, 45 - 50	4	3	11/32, 50 - 55	4	3	11/32, 55 - 60	4	4	11/32, 60 - 65	5
41 - 45 lbs	3	5/16, 40 - 45	4	3	11/32, 40 - 45	4	3	11/32, 50 - 55	4	3	11/32, 50 - 55	4	3	11/32, 55 - 60	4	3	11/32, 60 - 65	4	4	11/32, 65 - 70	5
46 - 50 lbs	3	11/32, 45 - 50	4	3	11/32, 45 - 50	4	3	11/32, 50 - 55	4	4	11/32, 55 - 60	5	4	11/32, 60 - 65	5	4	11/32, 65 - 70	5	4	11/32, 75 - 80	5
50 - 55 lbs	4	11/32, 50 - 55	5	4	11/32, 50 - 55	5	4	11/32, 55 - 60	5	4	11/32, 60 - 65	5	4	11/32, 65 - 70	5	4	11/32, 70 - 75	5	4	11/32, 75 - 80	5
55 - 60 lbs	4	11/32, 55 - 60	5	4	11/32, 55 - 60	5	4	11/32, 60 - 65	5	4	11/32, 65 - 70	5	4	11/32, 70 - 75	5	4	11/32, 75 - 80	5	4	11/32, 80 - 85	5
60 - 65 lbs	4	11/32, 60 - 65	5	4	11/32, 60 - 65	5	4	11/32, 65 - 70	5	4	11/32, 70 - 75	5	4	11/32, 75 - 80	5	4	11/32, 80 - 85	5	4	11/32, 85 - 90	5



Using the code at the bottom, you need a 125 grain point, an 11/32 shaft with a spine of 55-60 and that you should be using a 5 inch fletch.

Weight of Point (P)		Length of Fletches Application and Calculation of Spine Values	
30 grs.	1	3 inches	3
70 grs.	2	4 inches	4
100 grs.	3	5 inches	5
125 grs.	4		

The above table works for high-performance longbows with a Whisper String (Fast Flight, Spectra, Dynafight, Exel)

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For recurve bows with a Whisper String (Fast Flight, Spectra, Dynafight Exel etc.) 4 lbs must be added to the factual draw weight.

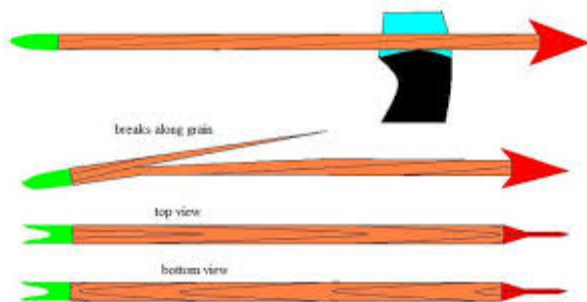
For bows made from pure wood and glass-laminated bows without a bow saddle, 5 lbs must be subtracted from the factual draw weight.

Once you have your shafts, the first thing to do with a set of shafts is to inspect them for straightness, you can do this by rolling them on a flat surface.

The next thing to do is to have a look at the grain particularly on what will be the underside of the shaft, if you use a longbow, this is the part of the shaft that will pass over the hand so it is important to see if there are any “break outs” on the grain underneath the arrow, if there are then turn the arrow round so that any breakouts point towards the back of the shaft and away from the hand. This will determine which is the front and which the back of the arrow and which way up/down.



This arrow has been turned 90 degrees to show the breakout



If the arrow breaks you want to make sure that it breaks away from your hand

Once you have done this attach the point, always use glue, even if using a screw on point. If you do the point first this gives you the option, should you mess up on the point, to cut off and start again (unless you use a 32” arrow). Once you have the points mounted you can cut to length.

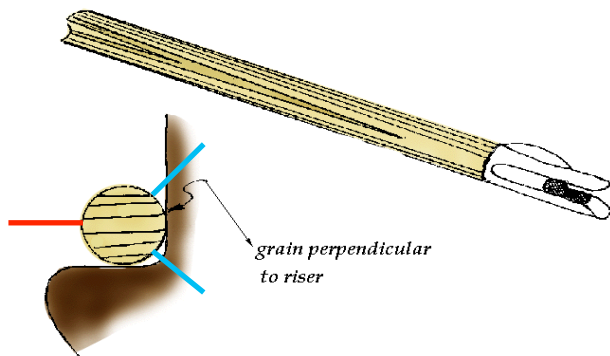
I have made myself a special cutting board, well it's just a length of 2" x 4" wood with a groove cut in (with a router) and then I have cut a slot (very much like a mitre box). The benefit of this is that the shaft is supported (which stops splinters), there is a slot so that you arrows are cut consistently straight. In addition I also use a Dozuki saw, which is specially designed for fine cuts. Having said that, a junior hacksaw with the blade reversed (such that it cuts on the pull rather than the push stroke) works fine. When cutting arrows: Always be careful that you don't get splinters, support the offcut, cut at right angles to the grain and unless using a cutting board, clamp the arrow and cut slowly and carefully.



Dozuki Saw

You should now have your shaft cut to length and with the point attached.

Have a look at the end grain again and now put a pencil mark on one side of the shaft from the nock end and in line with the end grain. This is where the cock fletch will go, you are shortly going to put a taper on the end of the shaft and will make the direction of the end grain more difficult to see, as you are going to put the cock fletch on the shaft in alignment with the end grain this makes end grain position more easily identified.





The taper tool is a very simple and looks like an enlarged pencil sharpener and is used in exactly the same way. Taper tools come in either 5/16 or 11/32 arrow size. (Do not use a 11/32 taper tool for a 5/16 arrow or vice versa). There are two holes, the more acute angle is for the nock and the less acute for the point (if you are going to taper it).



On my taper tool I have marked the two blades with a P (for point) and N (for nock) with a permanent marker to make sure I don't mix the two holes up. When using the taper tool keep turning and shaving wood off until no more wood comes out. Unlike a pencil sharpener, once the correct angle is reached no more wood will come off.

**Sealing Arrows:** Wooden arrows which have not been sealed will absorb moisture when shot in wet conditions and when they dry, they may dry unevenly leading to warping. There are numerous ways of sealing arrows, many garden products will do the job. The thing to consider is whether it will have a flexible waterproof coat. Some coatings can flake off and are not recommended. If you are going to use varnish, make sure you thin it such that it goes on in a thin flexible coat. My own preference is to use Danish Oil, which is a wood finishing oil, with one of the main constituents being tung oil. There is no defined formulation so it's probably worth getting a better quality oil as composition varies between manufacturers. The plus points are:

- It dries in 4-6 hours per coat.
- It can be applied with a cloth and be reapplied with ease for continued protection.
- It has a low odour when drying, and none when dry.
- It penetrates into all the wood, nourishing and protecting.
- It gives an attractive natural low sheen finish enhancing the natural beauty of wood.
- It is dirt resistant and is naturally water/fluid resistant.
- It does not leave a surface film, and unlike varnish will not chip, flake, crack or peel.

The only negative is that it is "thin" and it will not fill in any imperfections in the surface of the arrow.

**Cresting/Arrow Socks:** A cresting jig is a machine that will spin your arrow, such that you can paint bands of different colours to personalise your arrows.

The results look amazing, however new crestring jigs cost over £200. There are plans on the internet/youtube, there's even one made from Lego. I have decided that this is not a priority, but if you get into arrow making this is something you could consider later on.



An assortment of crested arrows

Having said that, there is an alternative, which is to use arrow socks/wraps. These are polyurethane plastic films which wrap around the end of the arrow. These are very common when people customise carbon or aluminium arrows, but are also available for wooden arrows. The advantage of socks is that they look great and it's easy to get fletching off, (as long as you are careful), should you decide you don't like the fletching or you want to cannibalise the fletching from a broken arrow.



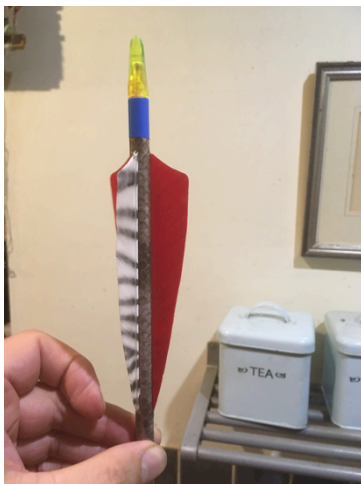
An assortment of arrow socks/wraps

**Fletching Jig:** most fletching jigs will take an assortment of fletches, there is no hard and fast rule. You can pick them up for as little as £10 on Ebay. Have a look at the reviews. My own jig is a Bearpaw deluxe fletching jig, which retails for about £45. It came with a right helical clamp, which will set feathers in a helical pattern to make the arrow spin (more accurate but more drag). You can also buy left helical or straight clamps.



Bearpaw Deluxe Fletching Jig

**Fletching:** The rule of thumb for fletching is that they should be as far back as possible because they are the control surfaces of the arrow and the further back they are then the greater the control effect they will exert. Having said that, I allow 0.4 of an inch as this allows my fingers around the back of the arrow and it allows me to use insulating tape to mark the arrows for field shooting (red, blue & white, corresponding to the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> arrow).



When choosing fletching colours I like to have the cock fletch a different colour from the others. The other thing is I like my arrows to stand out. They are a lot easier to find if they are bright colours, or lighter colours (especially if you occasionally lose an arrow). I like to start fletching with the cock feather first. The ridge on the index nock is where you want to place the cock feather, check that your fletching jig is set up for 3 feather fletching (turns 120 degrees each time) and line up the nock ridge with the clamp.



**Fletching Glue or Tape** – Again this is personal choice. My preference is to use fletching tape. The reason for this is because if you are using glue, it has to be dry before taking the clamp off. Unlike straight rubber fletching where it will stay in place if not fully dry, feathers do not stay in place and try to bend back to a slight curve. I can fletch a full set of 12 arrows in less than 2 hours, it's just not possible if you are using glue (even fast setting super glue). If you do want to use glue my advice would be to use a gel type glue as it will not run over the shaft.

To start fletching place the cock feather in the clamp, I allow 0.4 of an inch from the back of the feather to the end of the clamp. Again it's up to you where you place the fletching, but it works for me. Some people sand the edge of the feather to make it smoother but I have not found any need to do this.

**Glue** - Once in the clamp, if you are using glue, put a trail of glue on the feather (not too thick or it will spread) and then carefully put the clamp against the shaft, making sure the clamp is lined up correctly (if you haven't done it before, do a couple of dry runs to make sure you know where the clamp is supposed to go), leave the glue to dry (in accordance with the manufacturers guidelines) and then once the required time has passed remove the clamp and fletch the next feather.



**Tape** – If using tape put the feather in the clamp as before and then put the tape on the arrow. I use the trailing end of the feather to start the tape (nock end of the feather) and then go along the feather towards the leading edge and then keep going for about  $\frac{1}{4}$  to  $\frac{1}{2}$  inch before cutting the tape. With the overlap push this onto the clamp to make it stick. Make sure you go along the fletching with your fingernail to make sure it is glued to the arrow and then remove the backing (leaving the double sided tape on the fletching). By sticking the tape to the clamp you can start to peel the backing off (almost impossible if just on the feather). Once you have done this, use a small sharp blade to cut the tape, removing the overlap by scraping it off using a fingernail. Once you have done this place it on the shaft (the same as for using glue), but once in place you can immediately remove the clamp.



When all three feathers have been stuck to the shaft, I run my fingernail down the flat edge of the feather to make sure it is glued on properly.

Whether using tape or glue, I always use a small dab of glue on the leading edge and trailing edge of the feather to make sure it will not come off. I do this for every feather. I like to use HMG glue for this purpose as it has a very fine nozzle which makes this easy and the glue works a treat.

Enjoy your arrow making. Feel free to share this