



# Brixham Archers Arrow Workshop 2015

Arrow Making – Aluminium/Carbon Composite

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# Parts of an arrow



# Arrow Types

## Aluminium

- Aluminium arrows have the highest precision-to-price ratio of any arrow construction. The XX75 is the best selling arrow shaft of all time, but when bow manufacturers started making faster bows, archers wanted a lighter arrow. An aluminium arrow with the same spine as an all-carbon arrow will always be heavier.
- The way to make an aluminium arrow lighter and hence faster is to reduce the diameter, and the wall thickness, but by doing this, we significantly reduce the strength of the arrow. It is only a rolled piece of metal, and at some point it will collapse or bend

Pros	Cons
Cost	Not as "flat" shooting as other arrows
Precise weight and spine specs	As weight decreases, so does strength
Arrows can sometimes be straightened if bent	Different points and nocks can be hard to find
More Spine Choices	

# Arrow Types

## Carbon

- Weight is the primary reason archers switch to carbon arrows, but improved speed and range thanks to a smaller diameter shaft and durability also helps the decision. Carbon doesn't bend like aluminium, so straightness issues are not a problem. The higher velocity of carbon arrows helps overcome errors in range estimation and keeps the arrow flight flatter.

Pros	Cons
Less Wind Drift	Velocity accelerates quickly, but also sheds quickly
"Flutter" Shooting	Costs more than aluminum
Arrows can sometimes be straightened if bent	Accessories can be hard to find
F.O.C can be easily manipulated with accessories	
Advancements in arrow manufacturing are leading to more precise weight and spine specs	

# Arrow Types

## Carbon/ Aluminium

- Easton is in the unique position of being able to manufacture both aluminium and carbon arrows as well as hybrid A/C shafts with an aluminium core wrapped in carbon ,so advantages can be combined. They deliver the strength and durability of a carbon arrow, and the spine consistency, weight tolerances, and accuracy of an aluminium arrow.
- Because of the enhanced and difficult manufacturing process, A/C arrows tend to be priced higher than all-aluminium or all-carbon counterparts. However, when considering the overall benefits and that the only downside is a slightly higher price, A/C arrows are a fantastic buy and the top choice of many pro-level archers.

Pros	Cons
Best of both worlds	Slightly Higher Cost
Carbon fibers and epoxy resin matrix bonded to the precision 7075 alloy core tube	
Arrows can sometimes be straightened if bent	

# Arrow Types

## “Full Metal Jacket”

- FMJs are the reverse of an A/C arrow, combining the best attributes of carbon and aluminium with a new twist. The small diameter and thick wall carbon-fibre core with Hidden Insert Technology(HIT) provides superior penetration, durability and accuracy. The aerospace alloy aluminium jacket provides more consistent spine, straightness, and weight than all-carbon arrows.

Pros	Cons
Reduced Vibration	Slightly Higher Cost
Easy arrow removal from targets	
Permanent finish	

# Choosing the Right Arrow Spine



- The spine rating of an arrow is simply a measurement of its stiffness. Each arrow will be available in a variety of stiffness: the lower the number, the stiffer the arrow. For example, a 330 arrow is stiffer than a 500 spine arrow.
- This number is called the static spine, which is how an arrow reacts when an 880-gram (1.94 lbs.) weight is suspended from the centre of the arrow. The measurement arrow is 29" in length and supported by two points, which are 28" apart.
- The number of inches the arrow deflects or bends X 1000 due to the weight is the spine size or measurement of an arrow.
- So, a 500 arrow bends .5-inches when the weight is applied.



# Choosing the Right Arrow Spine

- For many arrow types ( and manufacturers) this number is what you need to make your selection. For example, if I knew I needed about a 500 spine arrow, I could choose a 520 or a 470 Easton ACE shaft from a list.
- For aluminium arrows however, which are the ones most beginners are looking for, Easton uses a different nomenclature. A 1916 arrow has an outside diameter of 19/64 of an inch, and a wall thickness of 16 thousandths of an inch. This actually gives us a spine of 623.

Shaft	Spine Size (inches)
1516	1.403
1616	1.079
1716	0.88
1816	0.756
1916	0.623
2016	0.531
2112	0.59
2115	0.461
2213	0.46
2214	0.43
2215	0.42
2216	0.375
2219	0.337
2311	0.45
2312	0.423

# Choosing the Right Arrow Spine

- All these measurements are based upon a 100gr point weight on a 28" arrow.
- By changing the point weight, or the length, we can further manipulate the dynamic spine of the arrow, ie. How it acts when it is shot.
- In general, in order to jump one spine group weaker add 2 inches. -or-
- In order to jump one spine group weaker add 50gr to the point.
- Now lets look at the selection charts -

# Choosing the Right Arrow Spine

COMPOUND BOW - RELEASE AID CALCULATED PEAK BOW WEIGHT - LBS.

**CORRECT ARROW LENGTH FOR TARGET/FIELD/3D**

ATA Bow Rating up to 275 FPS	ATA Bow Rating 270-300 FPS	ATA Bow Rating 301-340 FPS	23"	24"	25"	26"	27"	28"	29"	30"	31"	32"	RECURVE BOW WEIGHT -LBS FINGER RELEASE
29-35 lbs. (13.2-15.9 kg)			00	01	02	03	T1	T2	T3				21-27 lbs. (9.5-12.2 kg)
35-40 lbs. (15.9-18.1 kg)	29-35 lbs. (13.2-15.9 kg)		01	02	03	T1	T2	T3	T4	T5			27-32 lbs. (12.2-14.5 kg)
40-45 lbs. (18.1-20.4 kg)	35-40 lbs. (15.9-18.1 kg)	29-35 lbs. (13.2-15.9 kg)	02	03	T1	T2	T3	T4	T5	T6	T7		32-36 lbs. (14.5-16.3 kg)
45-50 lbs. (20.4-22.7 kg)	40-45 lbs. (18.1-20.4 kg)	35-40 lbs. (15.9-18.1 kg)	03	T1	T2	T3	T4	T5	T6	T7	T8	T9	36-40 lbs. (16.3-18.1 kg)
50-55 lbs. (22.7-24.9 kg)	45-50 lbs. (20.4-22.7 kg)	40-45 lbs. (18.1-20.4 kg)	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	40-44 lbs. (18.1-20.0 kg)
55-60 lbs. (24.9-27.9 kg)	50-55 lbs. (22.7-24.9 kg)	45-50 lbs. (20.4-22.7 kg)	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	44-48 lbs. (20.0-21.8 kg)
60-65 lbs. (27.2-29.5 kg)	55-60 lbs. (24.9-27.9 kg)	50-55 lbs. (22.7-24.9 kg)	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	48-52 lbs. (21.8-23.6 kg)
65-70 lbs. (29.5-31.8 kg)	60-65 lbs. (27.2-29.5 kg)	55-60 lbs. (24.9-27.9 kg)	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	53-57 lbs. (24.0-25.9 kg)
70-76 lbs. (31.8-34.5 kg)	65-70 lbs. (29.5-31.8 kg)	60-65 lbs. (27.2-29.5 kg)	T5	T6	T7	T8	T9	T10	T11	T12	T13	T13	58-62 lbs. (26.03-28.1 kg)
76-82 lbs. (34.5-37.2 kg)	70-76 lbs. (31.8-34.5 kg)	65-70 lbs. (29.5-31.8 kg)	T6	T7	T8	T9	T10	T11	T12	T13	T13	T14	63-67 lbs. (28.6-30.4 kg)
82-88 lbs. (37.2-39.9 kg)	76-82 lbs. (34.5-37.2 kg)	70-76 lbs. (31.8-34.5 kg)	T7	T8	T9	T10	T11	T12	T13	T13	T14		68-73 lbs. (30.8-33.1 kg)

■ No X10, ProTour, or ACE suitable in shaded areas above. Note: If your arrow shaft is over 1/2" inch more than the closest inch column shown on chart, round up to the next inch column. Example, if your arrow length is 28 1/2", use the 29" column.

ATA Compound Bow Rating 341-350 FPS				Shift one selection box stiffer Examples shift from box T8 to T9.				ATA Compound Bow Rating 351 FPS or Higher				Shift two selection boxes stiffer Examples shift from box T8 - T10.			
SIZE	SPINE	MODEL	WEIGHT GRS/INCH	SIZE	SPINE	MODEL	WEIGHT GRS/INCH	SIZE	SPINE	MODEL	WEIGHT GRS/ INCH	SIZE	SPINE	MODEL	WEIGHT GRS/ INCH
<b>GROUP 00</b>				<b>GROUP 01</b>				<b>GROUP 02</b>				<b>GROUP 03</b>			
1214	2.501	75	5.9	2-00	1.500	A/C/G	4.7	1250	1.250	A/C/E	5.1	1100	1.100	A/C/E	5.1
1413	2.036	75	5.9	1500	1.500	A/C/G	4.7	1300	1.300	A/C/G	5.1	1150	1.150	A/C/G	5.5
				1416	1.684	75	7.1	31-00	1.300	A/C/C	5.1	3-00	1.150	A/C/C	5.5
				1516	1.403	75	7.3	1514	1.379	X7	6.8	1200	1.200	Apollo	5.5
												1614	1.153	X7	7.7
<b>GROUP T1</b>				<b>GROUP T2</b>				<b>GROUP T3</b>				<b>GROUP T4</b>			
*920-1000R	0.920-1.000	A/C/E	5.8	*780-850R	0.780-0.850	A/C/E	6.0	*720-780R	0.720-0.780	A/C/E	6.4	*670-720R	0.670-0.720	A/C/E	5.9

# Arrow Shaft Cutting - Equipment

Arrow cutter



Isopropyl Alcohol



Cotton buds



Tape measure and pencil

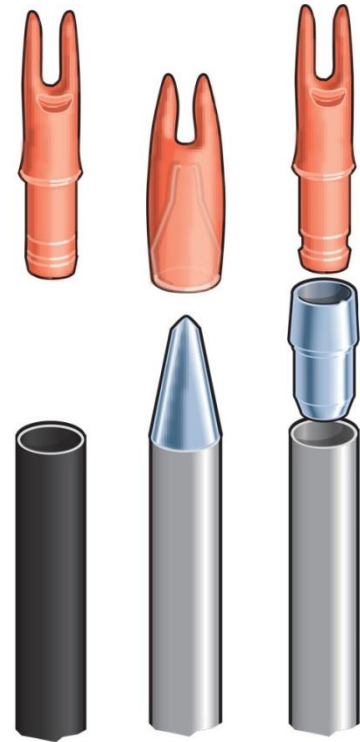


# Arrow Shaft Cutting - Preparation

- Check your shafts for damage at both ends!
- You will need to know how long your arrows need to be, this is generally draw length + 1.75 inches, or whatever you have calculated will provide the correct spine.
- If you are making new arrows, fit the nock collars and nocks; this will be covered later
- When measuring arrows, we measure from nock throat to the end of the shaft, not the point.
- Measure the shaft, and mark the correct length using a silver pencil or similar. It can be useful to measure and mark all of the arrows first, then compare all the lines. If they aren't all the same, there's been a mistake!
- In the case of ACE or other barrelled arrow spines, you should cut equal amounts off both ends, to retain arrow balance.
- Use the mark on the arrow to set up the arrow cutter distance

# Nocks

- Nocks allow the arrow to clip on to the string, it is important you select the correct Nocks for your arrows/string
- Nocks are available from archery retailers, and they can advise you on which nocks are correct for your shaft choice
- Older arrows used glue on Nocks, whilst push in have become more popular in order to allow quick changes.
- Push in Nocks can be inserted directly into the arrow shaft or pushed in to a Nock collar/ insert/ bus.
- Easton G-Nocks come with small and large groove, these are to accommodate different string serving diameter.
- Never file down or modify nocks to fit, always replace them.



# Points

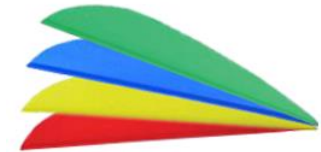
- Points for most Easton arrows can be glue in or screw in; screw in points use a glue in insert to attach to the arrow
- Points and inserts are glue into the shaft using hot melt
- We need a set of pliers to glue the points into the shaft
- We need a decent heat source.
- Different point weights are used to further modify the spine of the arrow, by adding weight, we can weaken the arrow.





# Fletching

- Fletching's are used for arrow stabilisation. They effectively add compensation for the inherent instability of the bows dynamic forces.
- Larger fletching's help stabilise your arrows over shorter distances, whilst creating too much drag over longer distances
- Fletchings come in lots of different designs which are primarily aesthetic. The variation between the flight of a shield and a parabolic fletched arrow is minimal.
- Fletchings are made of feathers or plastic, feathers are typically more durable.
- Fletchings can be shaped such as Parabolic, Shield, or Spin wings.
- Fletchings can be glued on or fixed using tape
- We need fletching's, adhesive, a fletching jig, and some Isopropyl Alcohol to fletch our arrows. If we are re-fletching we will need a glue remover



Plastic Parabolic



Feather Shield



Spin Wings

