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DIMENSIONING BAMBOO FERRULES

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The dimensioning of Bamboo Ferrules according to my theory and their making.

The only intention of this report is to promote my personal theory on dimensioning and making of bamboo ferrules among IBRA members. The dimensioning method derives from my experience over the past three years which hasn't always been positive, I've had a lot of misgivings but also just as much success.

Dimensioning

When I started making the connections on my rods with the bamboo ferrule system, I sought information on their dimensions and I referred initially to the two rodmakers whom I consider "masters" in the art of realizing Bamboo ferrules: the Dane - Bjarne Fries and the Argentine - Marcelo Calviello.

Figure 1

Patented F.I.B.H. connection Bjarne Fries – image from the website www.fries-rods.dk

Figure 2

Patented F.I.B.H. connection Bjarne Fries – image from the website www.fries-rods.dk

Figure 3

Patented BOBFS by Marcelo Calviello – image from the website www.ctrods.com

These are two types of profoundly differently conceived connections. The one by Bjarne Fries is a connection with a rather short and quite pronounced swell which in my opinion is very strong and with a low impact on the curvature of the rod under tension. Marcello Calviello's one is longer and it has the characteristic "mini ferrule" in metal which disappears inside the hexagonal cavity. My intentions were to achieve a bamboo ferrule which would be different from the Danish master's and the Argentine's one and which would be resistant, light, aesthetically proportioned to the rod and above all which could be realized without special instruments other than the Planing Form which we all have.

My first Bamboo ferrules looked disproportioned and did not satisfy me from an aesthetical point of view. That's why I dedicated some time to the study of this kind of connection in order to achieve a better quality.

First of all I carried out numerous experiments on the resistance of the wall making it thinner and thinner. These experiments led me to achieve a wall that was 50 one hundredths of a millimetre which once bound did not present any problems with resistance to breakage. Instead they had problems with flexing; they were so thin that they flexed under the force induced by the rod during casting.

If at first the flexing could be considered an advantage, because the ferrule when it bends does not interrupt the curve of the rod during the casting action, the truth is that an Hexagonal section during bending tends to deform and widen so that the top element would become loose and come apart from the male section of the connection (figure 4)

Therefore the technique of excessively thin ferrule walls is not the right one because it may look good but it gives big problems during use.

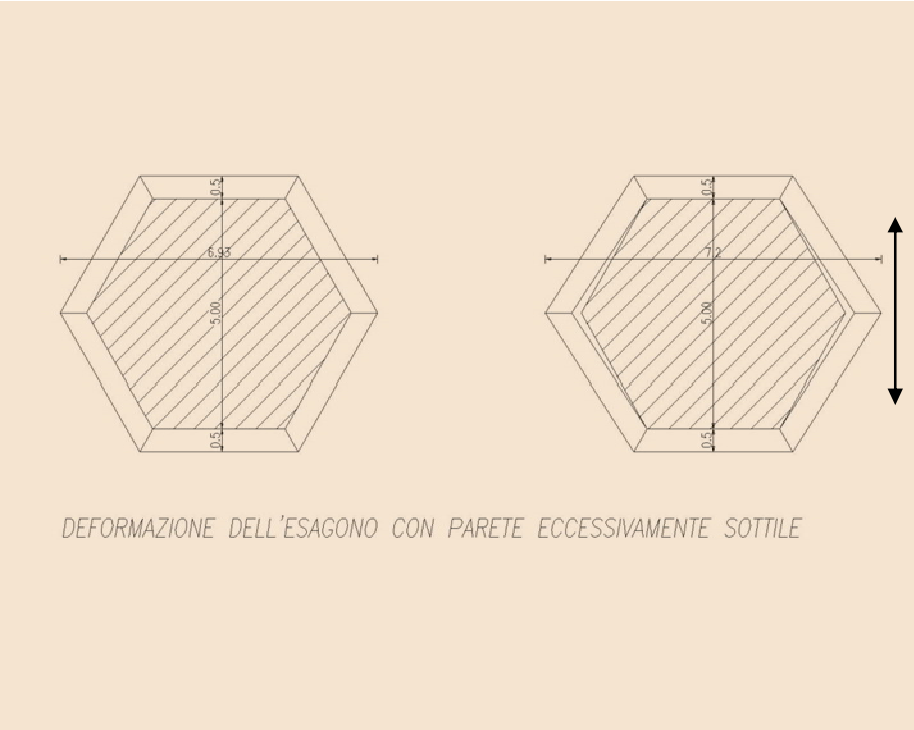

Figure 4

These tests allowed me to identify the elements which in my opinion are necessary in the design of bamboo ferrules:

- The wall thickness
- The depth of the ferrule
- The length of the swell

The wall thickness

The wall thickness is the main element which I considered and with respect to which I dimensioned the ferrule complex. I then carried out numerous tests graphically on CAD and practically in order to determine the exact dimensions of a typical ferrule from which I could then derive the measurements for all the oth-

ers. That's why I dimensioned the ferrule on a rod which I consider intermediate in the range of bamboo rods: a 7' with a section at point 42" of 5 mm, a rod on which a 13/64 metal ferrule would have been mounted. In this type of rod the wall thickness I determined as "ideal" for resistance and harmony with respect to the taper is 0.95 mm.

Figure 5

Minimum and maximum thickness

My test showed that you should not go below thicknesses of 0.85 mm to prevent the deformations previously indicated (figure 4). I also came to the conclusion that a wall thickness of 1.10 mm when well bound, is able to hold up to any exertion during the casting action.

I therefore determined that the wall thickness must be between:

Minimum Value 0,85 mm

Maximum Value 1,10 mm

Determining intermediate thicknesses

Taking into consideration the dimensions of the rod at the cutting point, with an increasing series between 3.50 mm and 6.50 mm and with increments of 0.10 mm, I determined the wall thickness of the ferrule in correspondence to every step of the section. These measurements cover practically all kinds of rods from 6' to 8'. The dimensioning was not carried out with linear increments with reference to a parabolic curve because the force induced on the ferrule is not directly proportional to the length of the rod. From these considerations we get the graph below with the relationship between the section of the rod with the wall thickness.

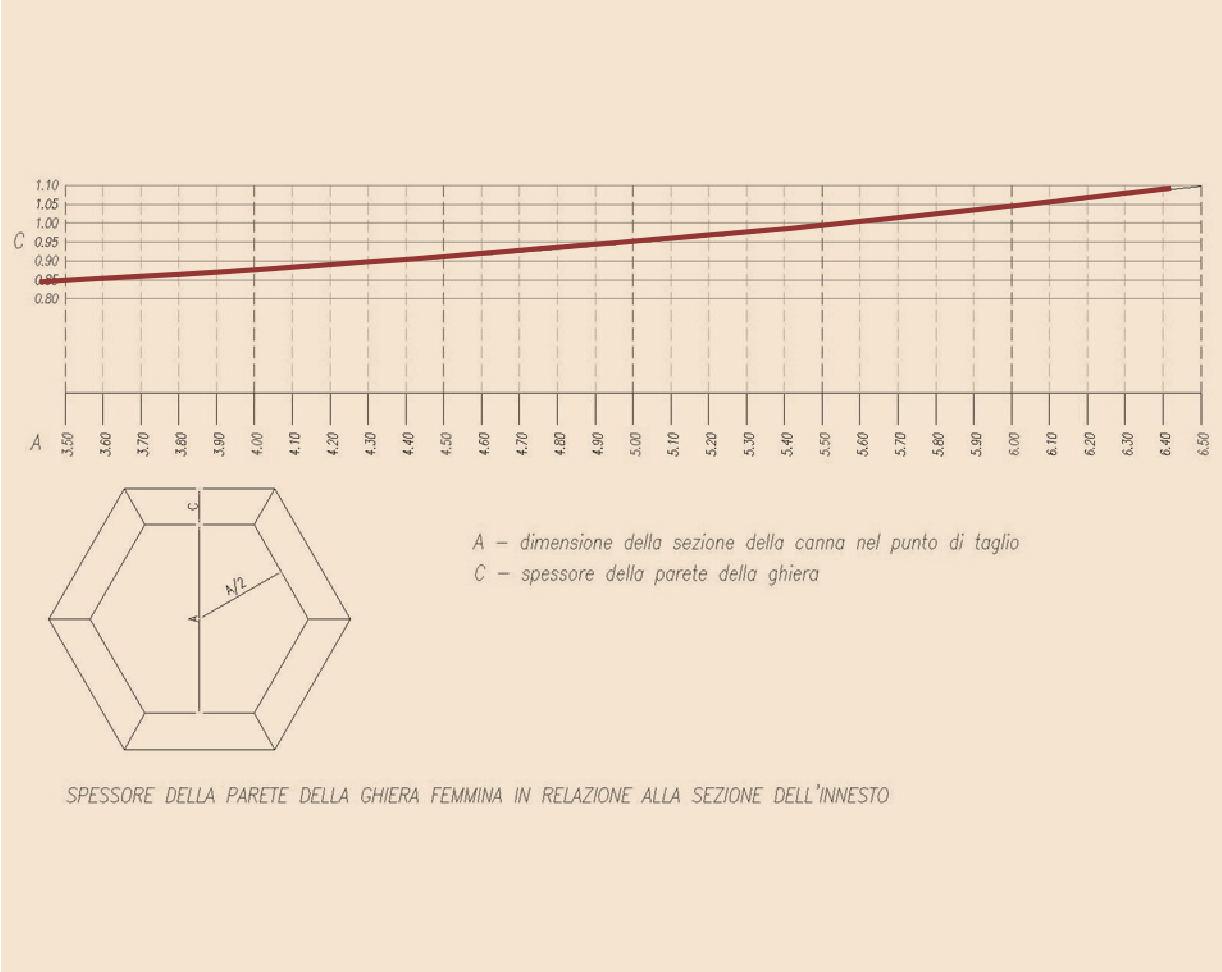

Figure 6

With these dimensions the wall thickness is, in my opinion, correctly dimensioned as it falls between 1/4 and 1/6 with respect to the section of the rod. (See Table A).

The depth of the Ferrule

The depth of the ferrule also needs to be correctly dimensioned. For this I worked using the experience I acquired with the wall thickness by determining the depth of a "typical" rod (the usual 7').

I defined that the "ideal" depth of the ferrule should be equal to 10 times the thickness of the wall. Therefore the "typical ferrule is 53 mm deep, calculated as follows:

b = 10 x a/c = 10 x 5,00/0,95 = 52,63 mm (rounded off to 53,00 mm)

With this calculation the depth of the ferrule is thus proportioned to the thickness of the wall and this all came out from the parabolic curve.

The minimum values and maximum values achieved are:

Minimum value 41,00mm

Maximum Value 59,00mm

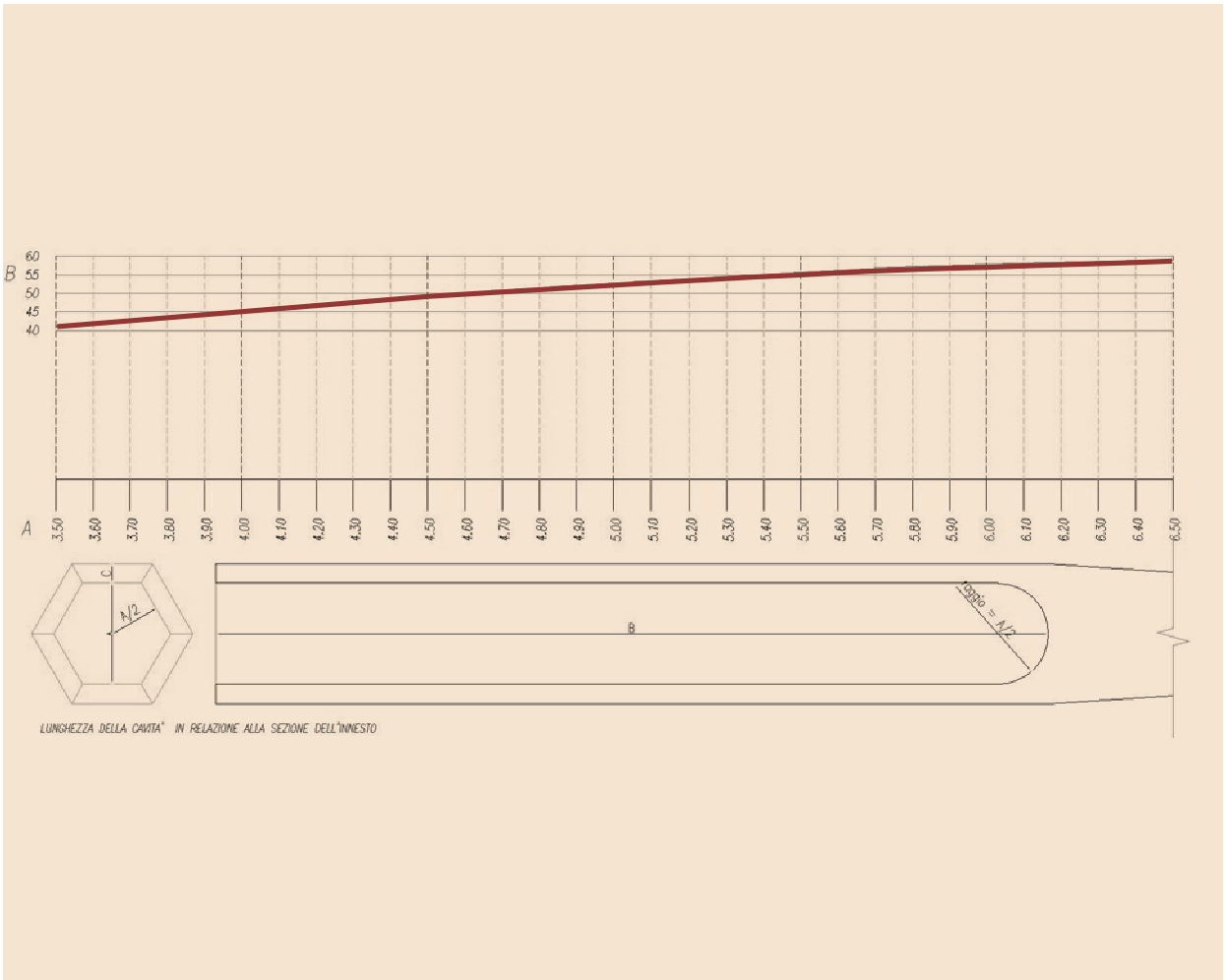

Figure 7

The length of the swell

Using a traditional planing form, with screws every 5", it is natural that the length of the swell is always this length too. However I discovered that the effect on the section of the rod is mitigated by the thinness of the walls which in any case varies with the length of the rod. It is therefore a swell which is not very pronounced and which satisfies me aesthetically.

All this is summarised in the following table, where the values are rounded off and where you can calculate the dimensions to adopt in order to realize a ferrule using my design and above all one can see harmony in the relationship of the dimensions of the various components of the ferrule.

TABLE "A" – DIMENSIONING A BAMBOO FERRULE

Length of the rod	Metal ferrule	BAMBOO FERRULE						
		Section of the rod at the dividing point		Length of the cavity - mm.	Wall thick-ness - mm.	Length of the Swell - mm.	Relationship between the section and the wall thickness	Relationship between the length of the cavity and the wall thickness
		inch.	mm.	10 x a / c				
		a	a	B	c	d		
6'0"	9/64"	0,1378	3,50	41,00	0,85	127,00	1/ 4,12	1/ 11,71
		0,1417	3,60	42,00	0,86	127,00	1/ 4,19	1/ 11,67
		0,1457	3,70	43,00	0,86	127,00	1/ 4,30	1/ 11,62
		0,1496	3,80	44,00	0,87	127,00	1/ 4,37	1/ 11,58
	10/64"	0,1535	3,90	45,00	0,87	127,00	1/ 4,48	1/ 11,54
		0,1575	4,00	45,00	0,88	127,00	1/ 4,55	1/ 11,25
6'6"		0,1614	4,10	46,00	0,88	127,00	1/ 4,66	1/ 11,22
		0,1654	4,20	47,00	0,89	127,00	1/ 4,72	1/ 11,19
	11/64"	0,1693	4,30	48,00	0,90	127,00	1/ 4,78	1/ 11,16
		0,1732	4,40	49,00	0,90	127,00	1/ 4,89	1/ 11,14
7'0"		0,1772	4,50	49,00	0,91	127,00	1/ 4,95	1/ 10,89
		0,1811	4,60	50,00	0,92	127,00	1/ 5,00	1/ 10,87
	12/64"	0,1850	4,70	51,00	0,93	127,00	1/ 5,05	1/ 10,85
		0,1890	4,80	51,00	0,93	127,00	1/ 5,16	1/ 10,63
		0,1929	4,90	53,00	0,94	127,00	1/ 5,21	1/ 10,82
		0,1969	5,00	53,00	0,95	127,00	1/ 5,26	1/ 10,60
	13/64"	0,2008	5,10	54,00	0,96	127,00	1/ 5,31	1/ 10,59
7'3"		0,2047	5,20	54,00	0,97	127,00	1/ 5,36	1/ 10,38
		0,2087	5,30	55,00	0,98	127,00	1/ 5,41	1/ 10,38
		0,2126	5,40	55,00	0,99	127,00	1/ 5,45	1/ 10,19
	14/64"	0,2165	5,50	56,00	0,99	127,00	1/ 5,56	1/ 10,18
		0,2205	5,60	57,00	1,00	127,00	1/ 5,60	1/ 10,18
7'6"		0,2244	5,70	57,00	1,01	127,00	1/ 5,64	1/ 10,00
		0,2283	5,80	57,00	1,02	127,00	1/ 5,69	1/ 9,83
	15/64"	0,2323	5,90	57,00	1,03	127,00	1/ 5,73	1/ 9,66
		0,2362	6,00	58,00	1,04	127,00	1/ 5,77	1/ 9,67
		0,2402	6,10	58,00	1,06	127,00	1/ 5,75	1/ 9,51
		0,2441	6,20	58,00	1,07	127,00	1/ 5,79	1/ 9,35
8'0"	16/64"	0,2480	6,30	58,00	1,08	127,00	1/ 5,83	1/ 9,21
		0,2520	6,40	59,00	1,09	127,00	1/ 5,87	1/ 9,22
		0,2559	6,50	59,09	1,10	127,00	1/ 5,91	1/ 9,09

In the schematic diagrams which follows, you will find three ferrules in scale, one on a 6' rod with section at point 36'' of 4,00mm, one on a 7' rod with section at point 42'' of 5,00 mm and one on a 7'6" rod with section at point 45" of 6.00 mm.

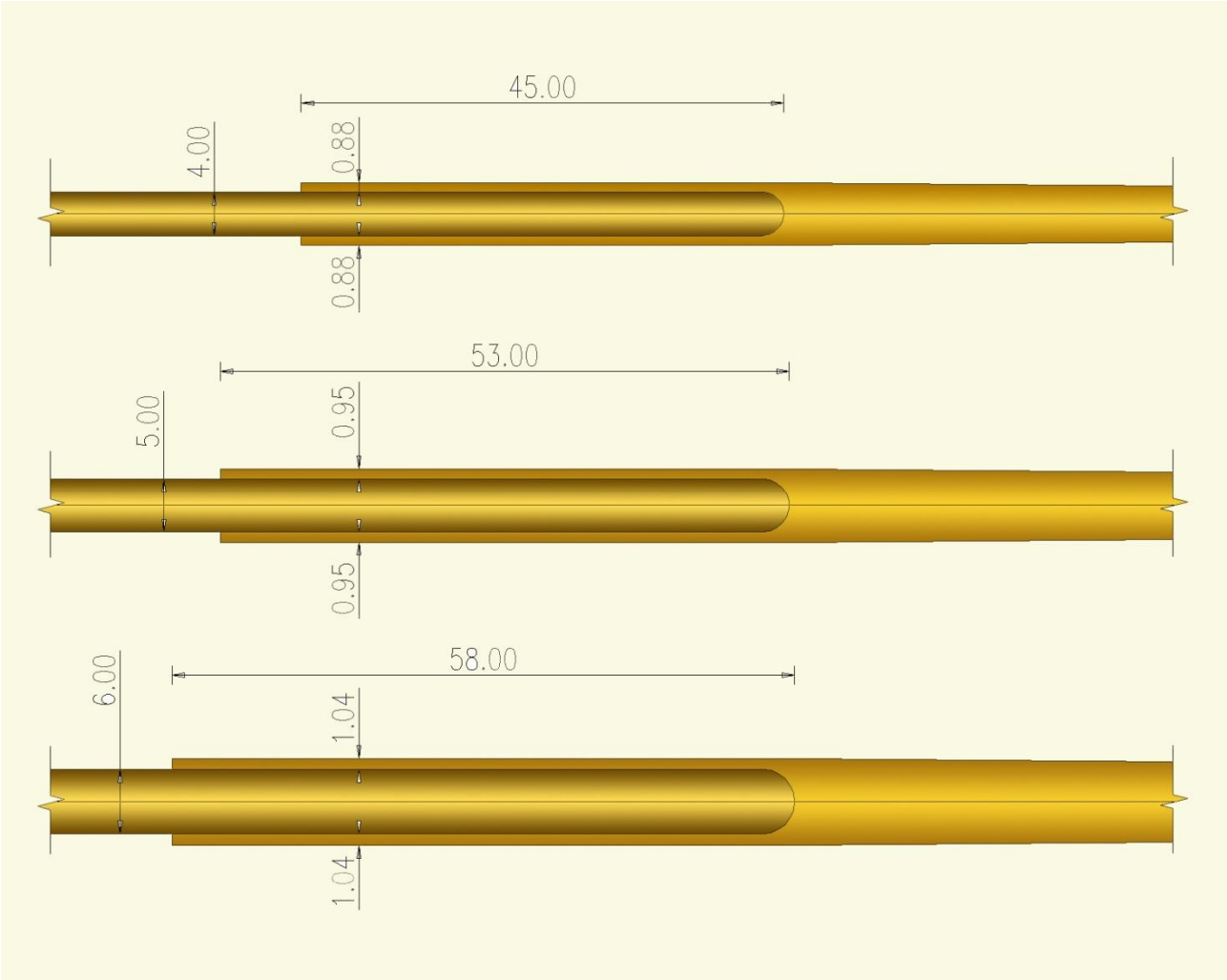

Figure 8

As you can see the ferrule dimensioned in this way maintains its harmonious characteristics of the shape.

The construction

The bamboo ferrule is composed of two parts, the male connection generally on the butt section and the female generally on the tip. Both elements must be realized with extreme precision because a sloppy connection will make the rod unusable for fly fishing.

The "Male"

On the butt section we will make the male part which is an element with an Hexagonal cross section and with no taper with a length equal to the cavity of the "female" part. In order to realize it one must place the untapered strips in the planning form in such a way that the beginning of the untapered part lies on an adjusting screw. Let's take our 7' rod with a 5 mm section as an example.

The length of the cavity (Table A) is 53 mm so the strips must be :

84’/2’’ = 42’’ x 25,4 = 1066,80 mm + 53/2 mm = 1.066,80 + 26,50 = 1.093,30 mm

Rounded off to 1.093 mm

The positioning on the planing form will be as follows:

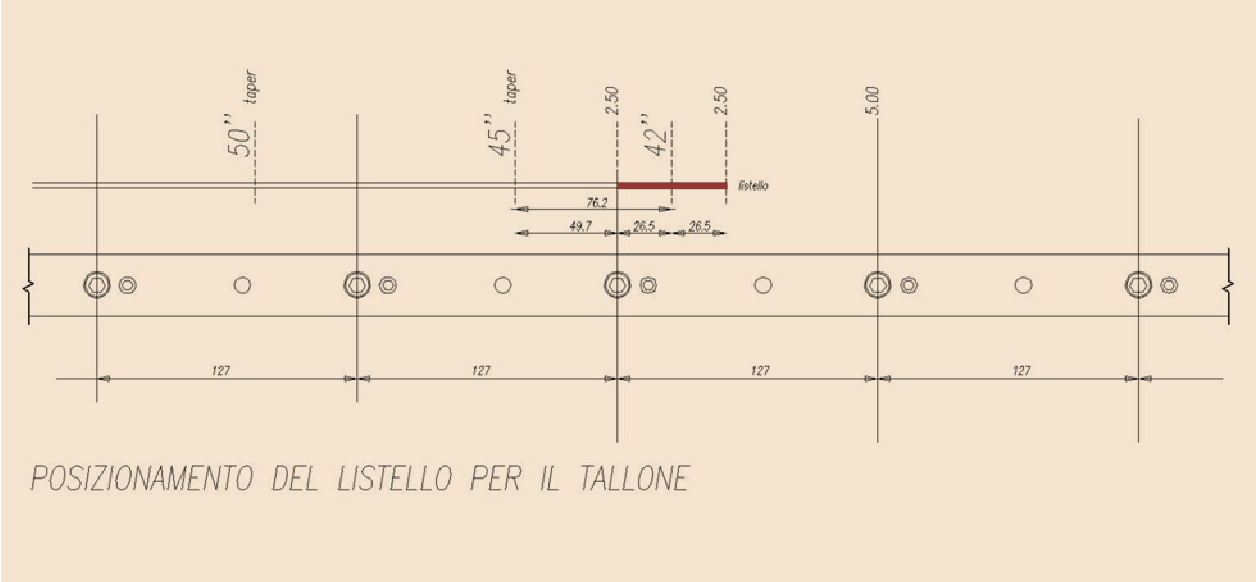

Figure 9

In practice we will position the strips in such a way to achieve a strip which does not taper in the last 53 mm and in order to respect the original rod taper we will carry out our measurements with the depth gauge at distance of 49,7 mm from the axis of the adjusting screw.

The “female”

The strip for the female section will be achieved in a similar way and the strip will be positioned as per the following diagram and the taper will be over dimensioned by 0.95 mm with respect to the original taper.

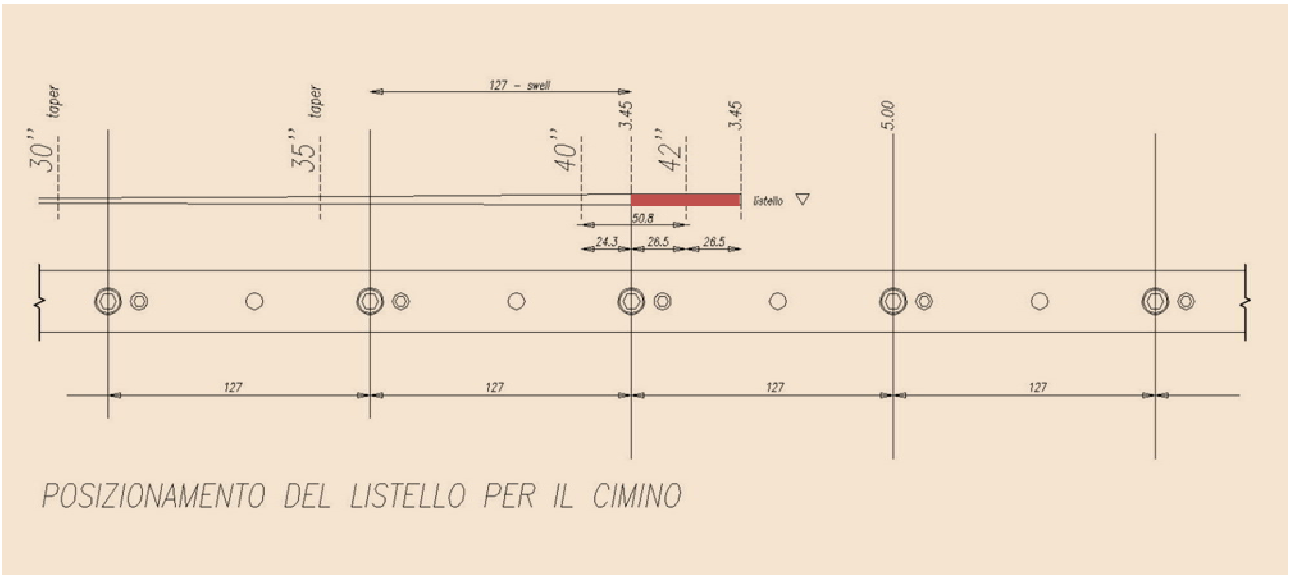

Figure 10

In practice we will position the strip in such a way as to realize a strip which is untapered in the last 53 mm and to maintain the taper sizes we will begin our measurements with the depth gauge at a distance of 24.3 mm from the axis of the adjusting screw.

Once we have made the six strips it will be necessary to make a cavity in the untapered section. To do this we can use two files – one round and one flat.

The diagram for this is as follows:

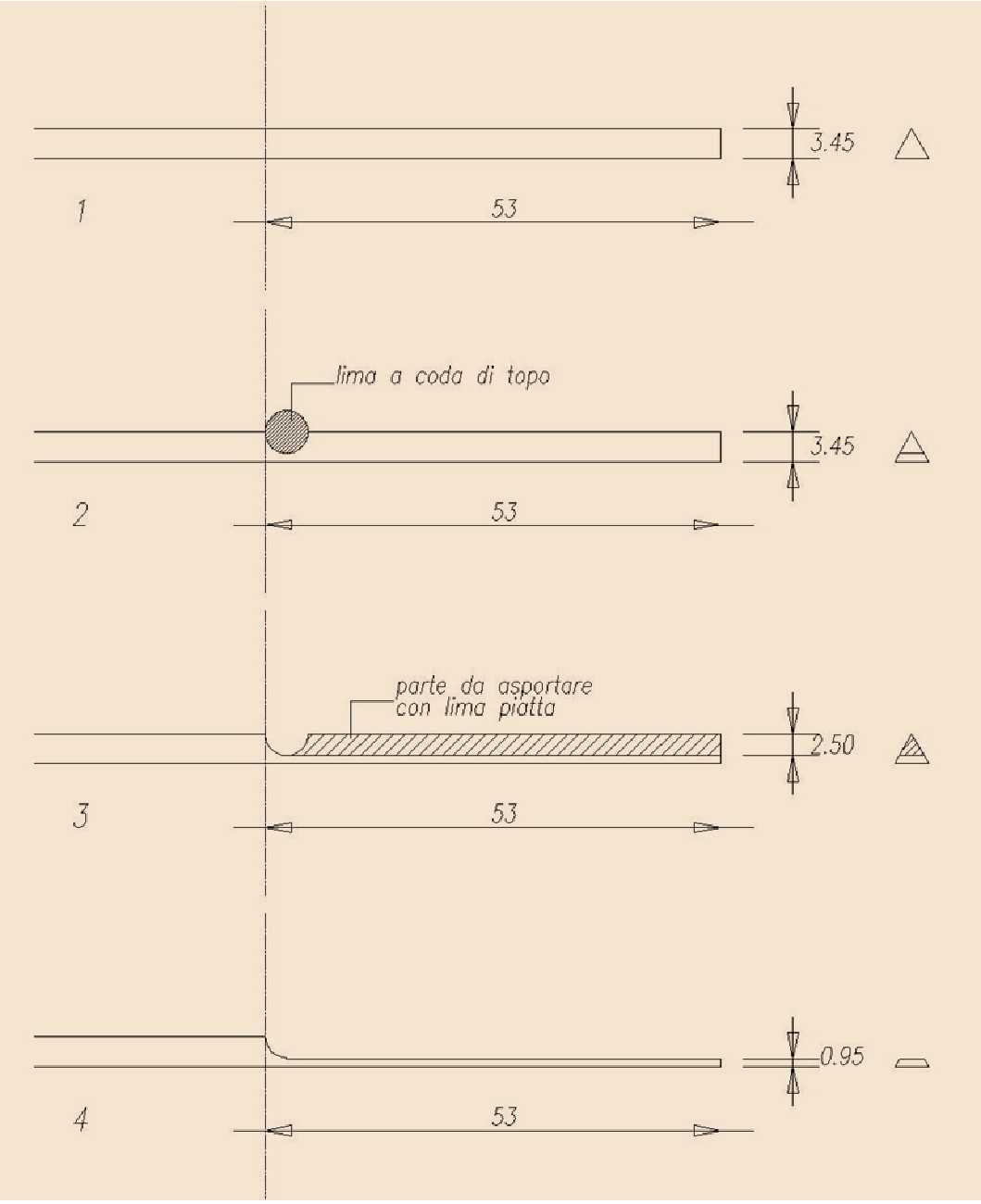

Figura 11

The cross section of the finished ferrule will be:

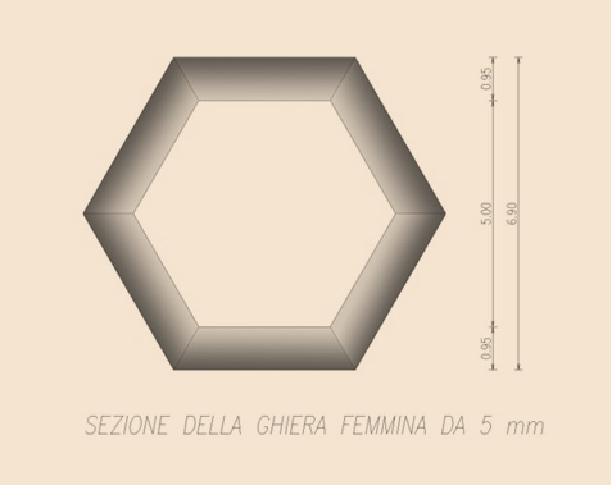

Figure 12 – transversal section

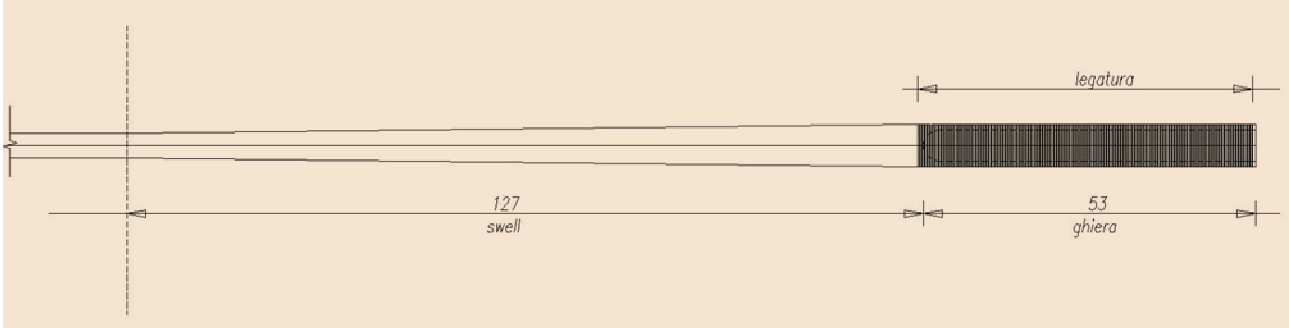

Figure 13- longitudinal section

Conclusions

I hope this will constitute a good base for my fellow rodmakers who intend trying to make bamboo ferrules and above all I hope it will help to refine the subject.

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