EUROPEAN GATHERING 2008

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STREAMLINED BAMBOO FERRULES

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Introduction

When I began my adventure with bamboo ferrules, I did so because I was fascinated by Bjarne Fries' ones (Fig. 1) that with their simplicity made bamboo rods look even better that usual.

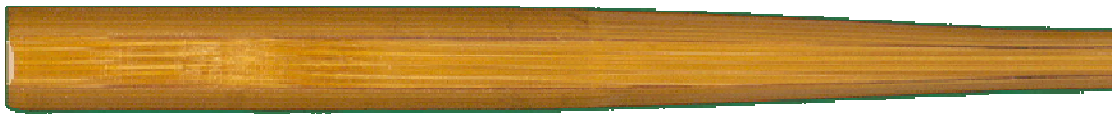


Fig. 1 – ghiera in bamboo di Bjarne Fries

From a purely aesthetic point of view, Calviello's ferrules looked the best (Fig. 2), but his ferrules had a small detail that I didn't like much : the little metal cylinder placed on the tip of the butt section.

Fig. 2 – ghiera in bamboo di Marcelo Calviello

I therefore began studying a method to make bamboo ferrules without the use of special tools but using only the tools that every rodmaker has in his shop and in particular with a normal planing form with 5" stations.

I was initially very skeptical about the strength of these ferrules and I therefore tried to find the "extreme limit", not for the pleasure of doing so, not to make something that hadn't been seen yet, but only to find the limit which one should not go over because I wish to remind you, we want to make fishing instruments and not something to be kept in a glass case.

I was pushed to reducing the thickness of the walls dramatically after I was given a paper by The Bioccia University of Milan on load test done in their physics laboratory. A breaking load of 800 kg/cm^2! Simply fantastic, why not put it to good use?

I never stop doing research even when I feet I had achieved good results because fundamentally rodmaking is purely a pleasure and so is doing something new all the time. Before I continue, I would like to thank Gabriele Gori because, as an engineer, he has always given me good advice that have allowed me to realize what I am about to illustrate. It is a well known fact that the work of an architect would remain on paper without an engineer taking care of the practical side.

The theory on bamboo ferrules presented at 2007 gathering

I will begin this essay with a brief summary about the theory I presented last year on the making of bamboo ferrules.

In practice the ferrule is designed on the rod taper following a few simple steps:

You design a taper with a continuous section and then find the mid point (fig. 3).

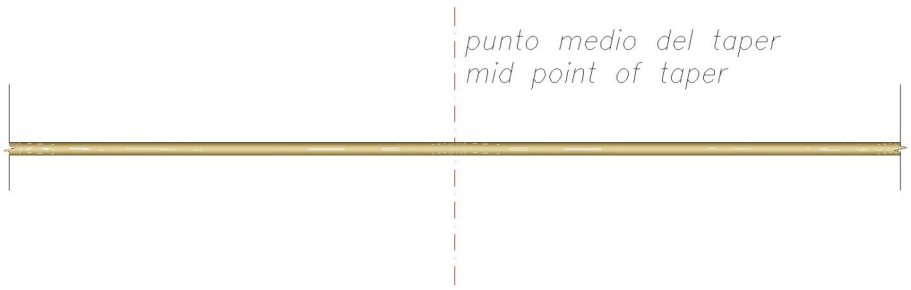


Fig. 3

1) You "divide" the taper and lengthen the tip and butt sections by ½ of the ferrule. (fig. 4).

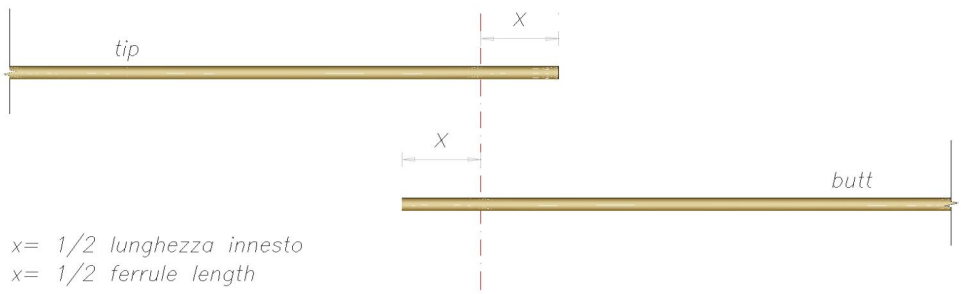


Fig. 4

2) You increase the section of the tip in the ferrule area by the thickness of the walls of the ferrule (fig. 5). The thickness is determined by the table on page15 (tab. A).

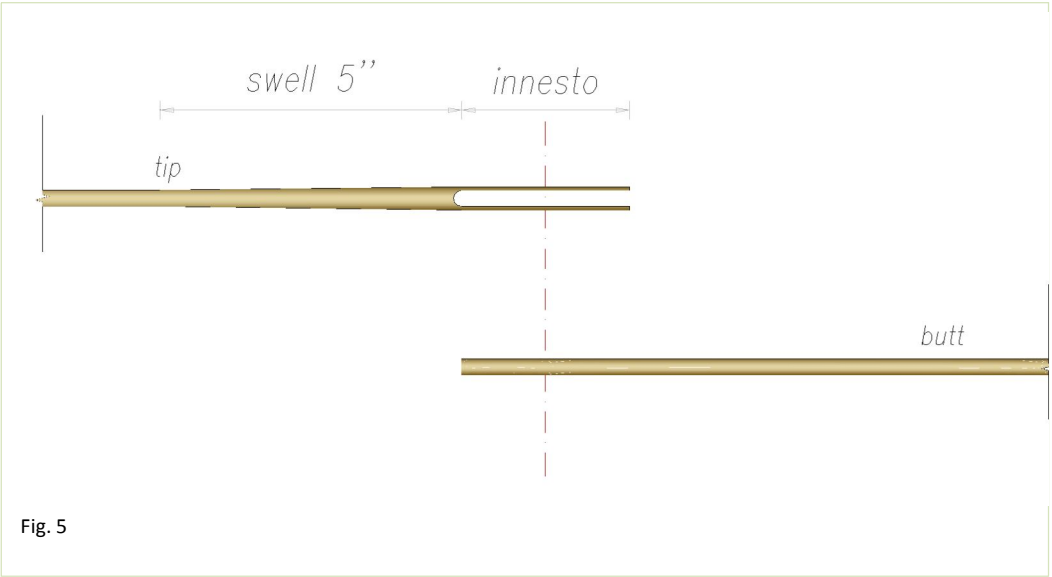


Fig. 5

With this system you get ferrules with the right strength and also a section that is in Harmony with the taper. (fig. 6).

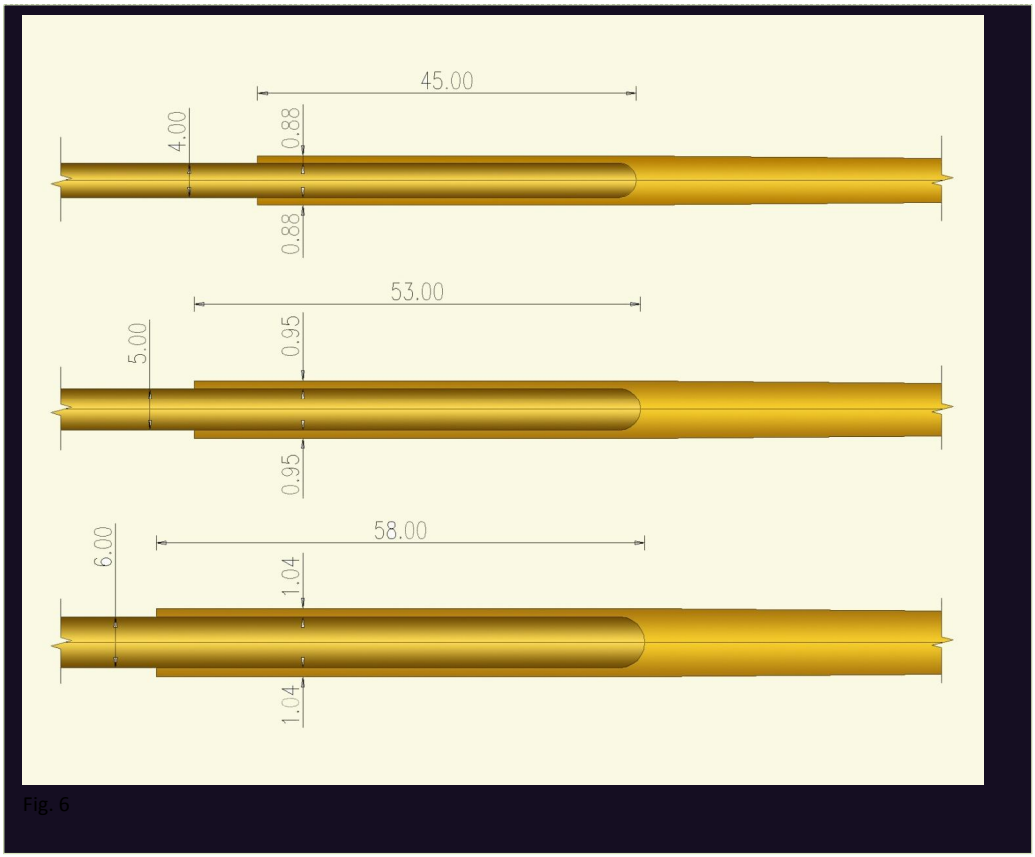


Fig. 6

This result which is good for the following reasons: aesthetically, resistance and function, did not however satisfy me because the tip section swelled a great deal – about 40% with respect to the butt and this makes it too evident.

So observing the table, in a rod with a 5 mm mid section diameter the ferrule is walls are 0.95 mm thick so the total section of this area is:

5,00mm+0,95mm+0,95mm = 6,90mm which equals a 38% increment from the original 5 mm section.

Too much!!. With Gabriele we therefore thought about reducing this swell by 50% in order to get a total section of 5.95 mm instead of 6.90 mm.

The streamlined ferrule

In order to reduce the thickness of the tip, I could not work on the thickness of the walls which are already at their limit, the only solution that emerged was to reduce the section of the butt in the male part.

From the male part of the ferrule we remove a thickness equal to ½ the wall thickness of the female. In this case i.e. in a rod with a 5 mm section we must reduce the male by 0.95% to bring it to 4.05mm.

Schematically the reduction can be seen in figure 7.

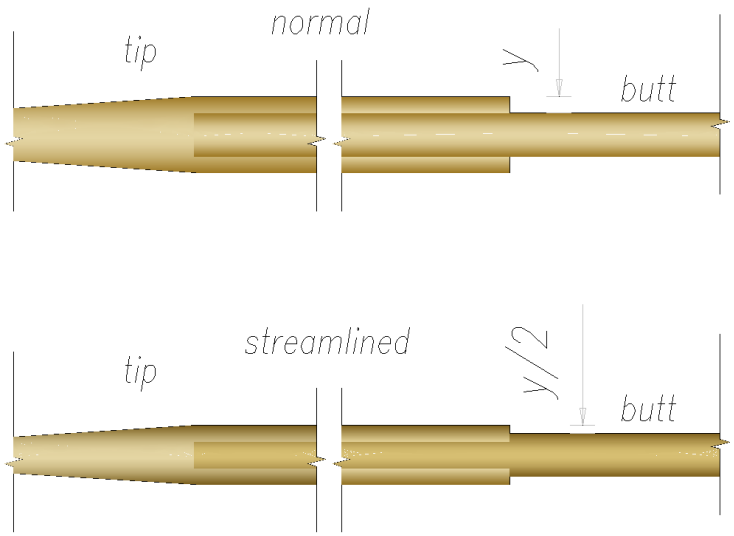


Fig. 7

The reduced taper of the butt bring forward two problems:

1) If the reduction involves removing material from the outside, we will damage the power fibres and the “spigot” will inevitably break (figure 8).

2) At the reduced point, the butt tends to break (figure 8).

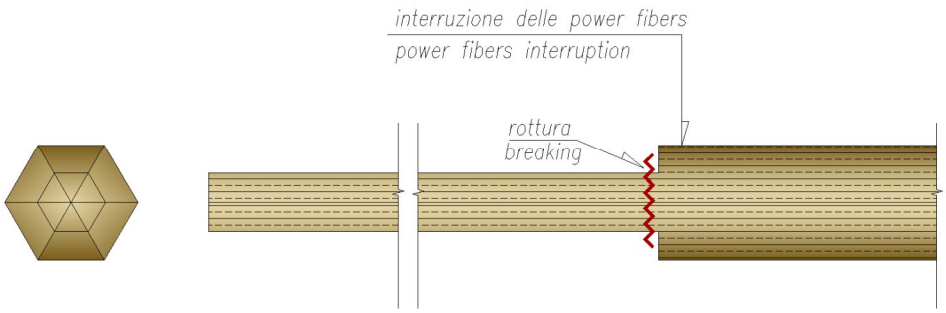


Fig. 8

To prevent this, the reduction must take place internally and without damaging the power fibres. To do this we make the strips of the butt following the taper dimensions and then with the use of a scaper we reduce the dimensions of the triangles by acting only on the internal faces making a small reduction about 10 mm long. (figure 9).

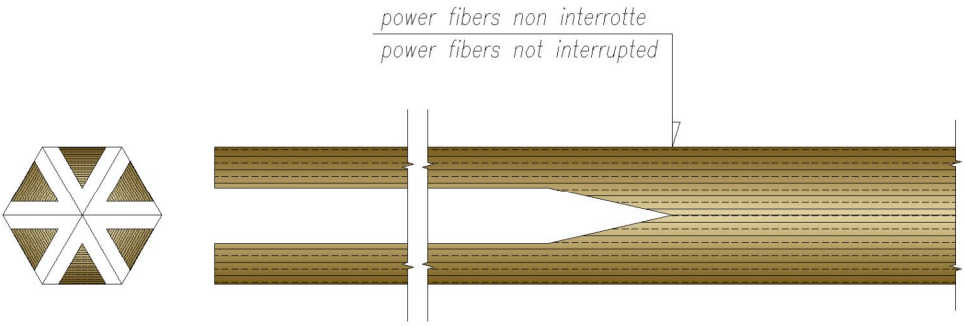


Fig. 9

Later we take advantage of the extreme plasticity of heated bamboo.

Working the strips in a hot air the strips are heated and bound very tightly and this spigot can be unbound later.

In this way the strips will curve without problems and they will keep this curvature once they have cooled down. (fig. 10).

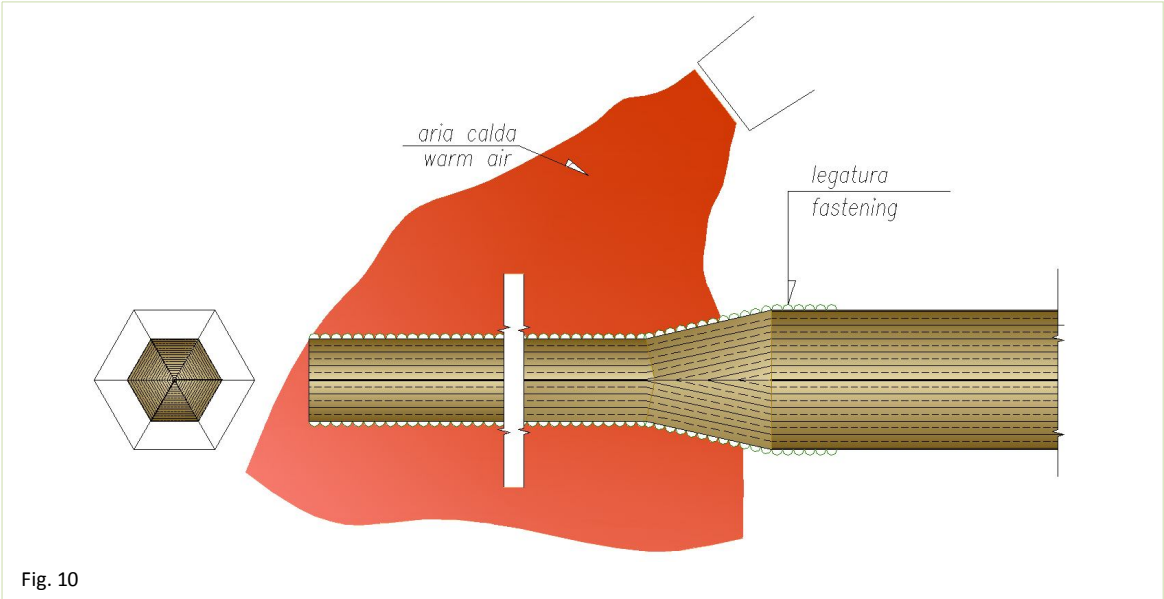


Fig. 10

After this operation the strips are ready to be glued and the spigot, which still has all its power fibres (above all their continuity) will have the same resistance of a rod that hasn't been reduced. Furthermore the 10 mm reduction will dampen the transmission of the internal forces of the rod and this will prevent breakage in the connection.

This procedure allows you to achieve a very refined ferrule which still has an adequate mechanical resistance.

Details of the streamlined ferrule

If from an aesthetic point of view the streamlined ferrule is extremely valid due to its reduced visibility on the rod and therefore it excels in the bamboo ferrule scene, we can say that from a practical point of view its effect on the rod action is really reduced.

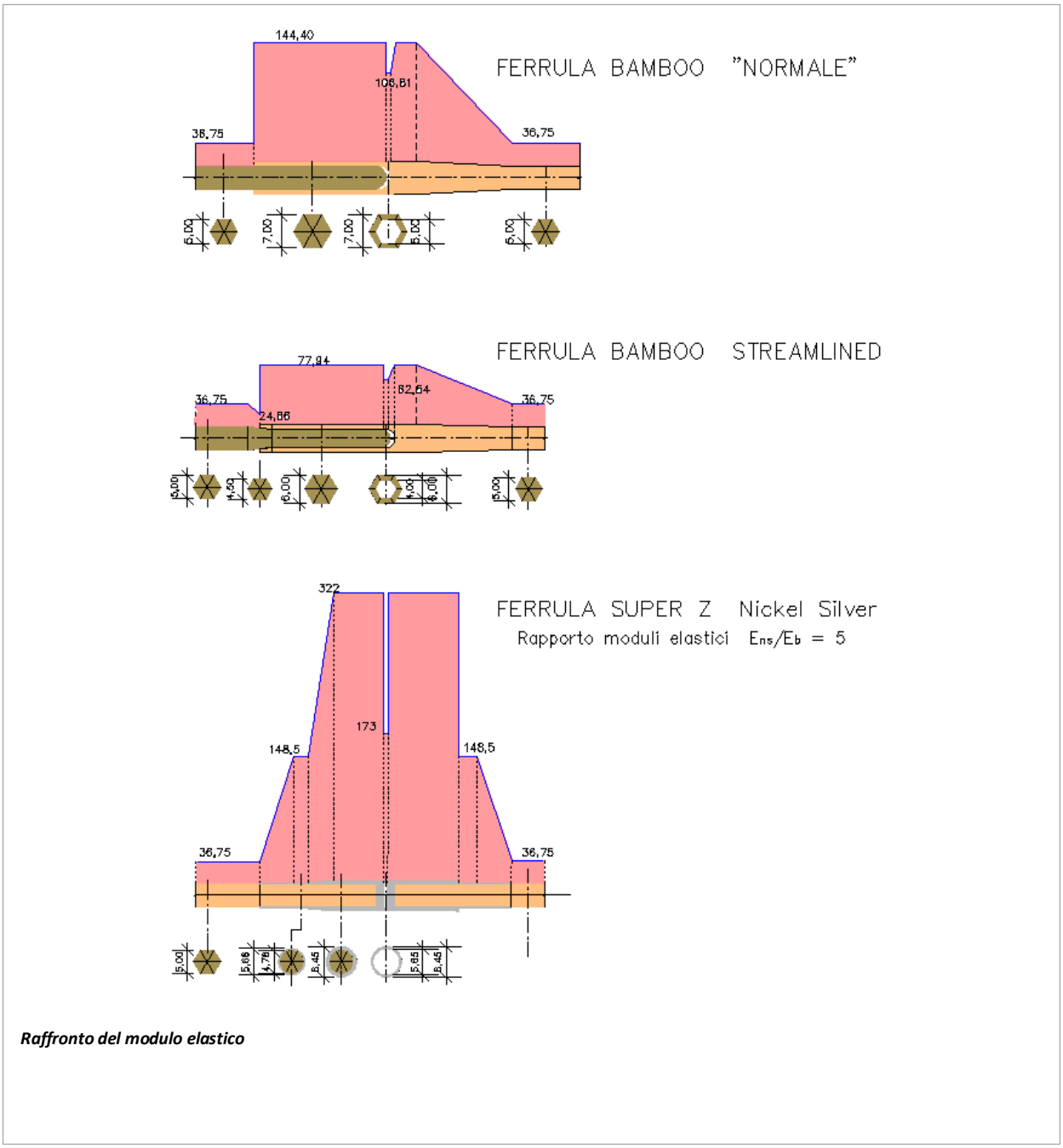
During various test which were carried out using twin rods – one with a traditional bamboo ferrule and one with a streamlined version we discovered an effective reduction of the influence of the ferrule on the casting action due to its reduced rigidity.

Gabriele Gori did a few mathematical calculations on the rigidity of this ferrule by comparing a Super Z Ferrule in Nickel Silver, a traditional bamboo ferrule and a streamlined bamboo ferrule.

I have copied his e-mail below in which he sent me the results and and very explicit graphs on the rigidity of the three ferrules.

"I've also added a comparison with a Super Z ferrule in NS
I unified the mixed NS/bamboo sections with a coefficient of 5 which for this test is rather prudential: probably the rigidity (elastic module) of NS is 5 times that of bamboo.
Even so the results are surprising: with respect to the rigidity of the rod, the normal bamboo ferrule has a resistance to flexing which is four times higher while the streamlined ferrule only twice and the Super Z actually nine times higher. I believe it is a great ferrule and a very important innovation. Gabriele Gori"

I will not add other comments.



Raffronto del modulo elastico

This ferrule was tested on the river and also with resistance tests by export casters that simulated extreme conditions of use.

Below you will find excerpts of the design project and some photos of the making of the ferrule on a 7' 4 # rod made especially for the 2008.

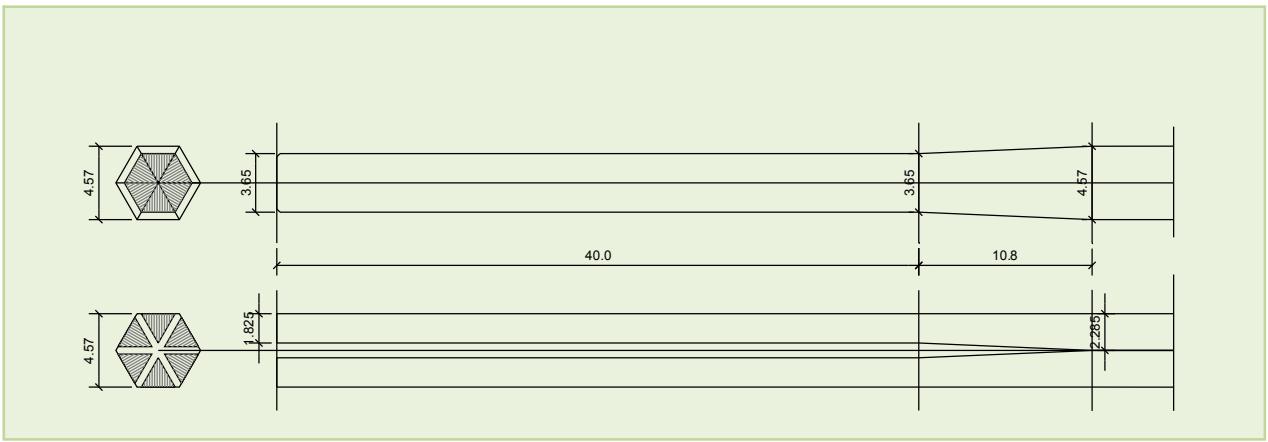
Sansepolcro, 24 maggio 2008

Alberto Poratelli

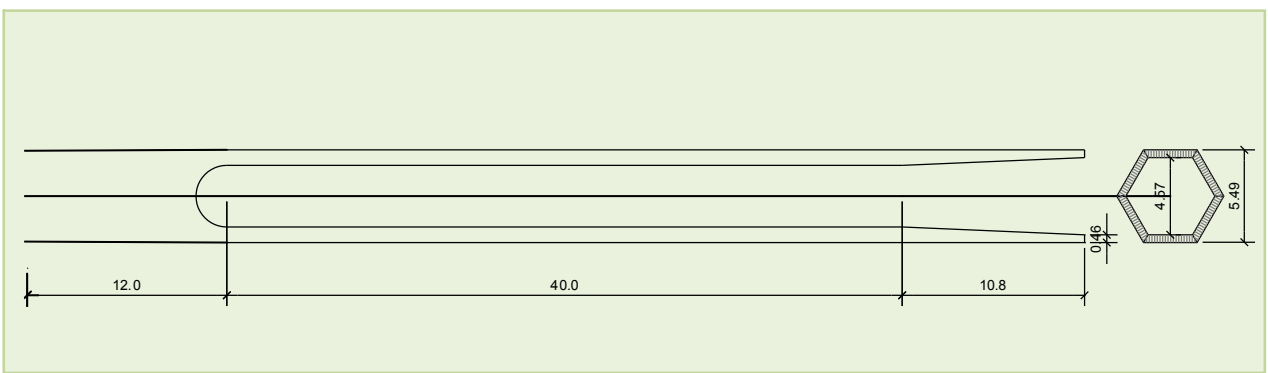
Gabriele Gori

The practical construction method

Of the streamlined ferrule on a 7'#4 rod – numbered n. 46/08



Details of the butt section diagram

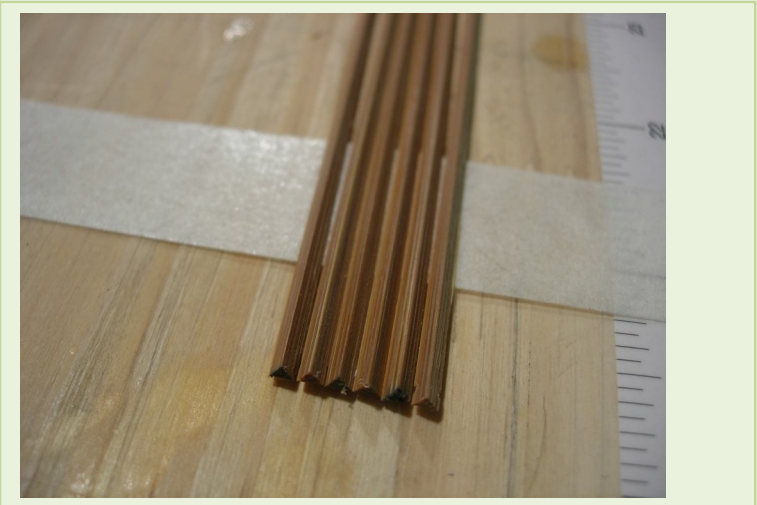


Details of the tip section diagram

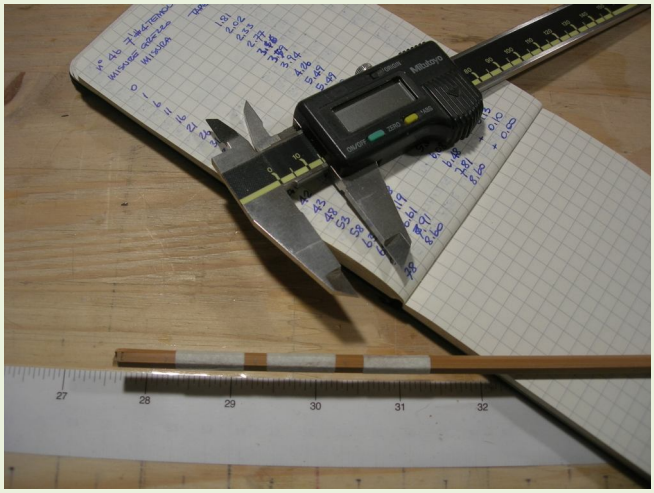
Some photos of the making of the butt section reduction

Setting the planing form

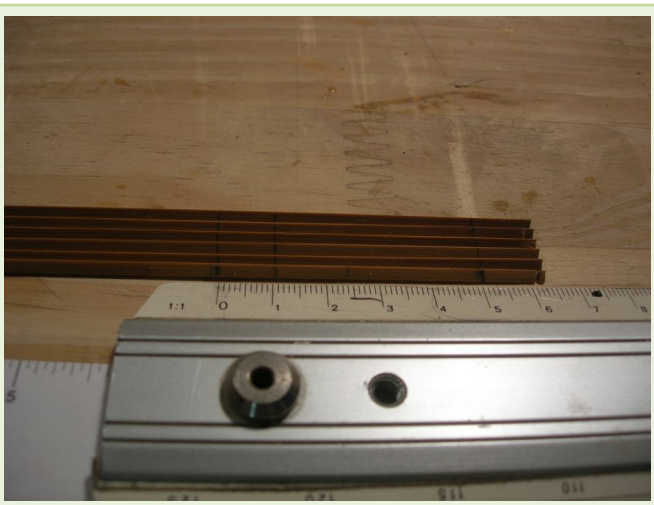
Normal strip of the butt section



Strips ready for "reduction"

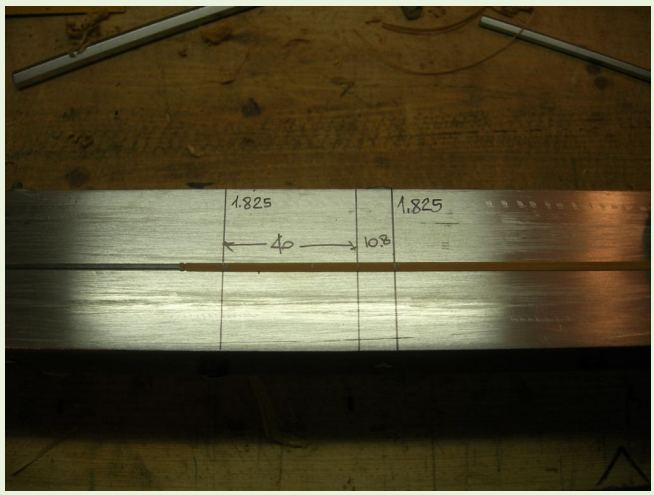


Checking the measurements of the butt.

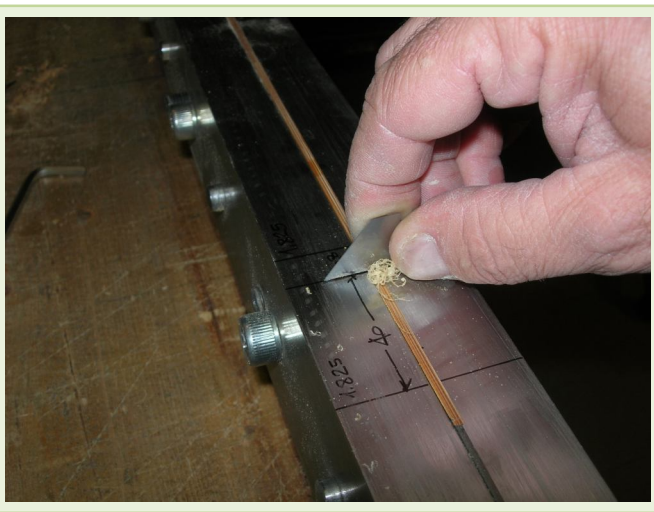


Marking the part to be reduced

New settings on the planing form



Indicating the new measurements on the p.f.



Scraping the strips

Measuring the reduced strip - station 41

Measuring the reduced strip - station 43

The bound reduction on the butt

Checking the measurements before gluing

TABELLA "A" - DIMENSIONAMENTO DI UNA GHIERA IN BAMBOO

lunghezza della canna	ghiera in metallo	GHIERA IN BAMBOO						
		sezione della canna al punto di taglio		lunghezza della cavità - mm.	spessore della parete - mm.	lunghezza dello swell - mm.	rapporto tra la sezione della canna e lo spessore della parete	rapporto tra la lunghezza della cavità e lo spessore della parete
		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

Test by Roberto Pragliola

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European Bamboo Rodmakers Gathering
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