

EFFECT OF INTERMEDIATE / SPIRAL WRAPPING ON STIFFNESS AND TWIST OF A HOLLOW ROD

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The intermediate wraps were very frequently used in the "classic" cane rods. Now we often think that it was because the glues (eg hide glue), varnishes etc were unreliable and the intermediates gave extra support to the rod. The rods were very valuable tools and they had to stay in form for a man's life. Certainly there also were traditions important for the manufacturers, sellers and buyers of the rod.

Thereafter we have discontinued to use intermediates – they are laborious to make and we think that our glues are better than the old ones. When we try to rebuild a broken section eg due to delamination it is however a reason to add silk intermediates to support the newly glued site.

Hollow building is a method to decrease the weight of the rod, to take away the soft pith of the cane and to increase the power (elasticity / weight) of the rod. Because the circular stiffness of cane strips is much less than longitudinal strength we have to include some extra support if we want to make significant or extreme hollow building and to achieve real benefit of the technique. Thus we are using techniques to include internal bridges, fluting etc supporting the hollow structure and to hinder the hollow tube to be flattened when bending causing delamination and break of the rod.

I have tried to make hollow build rods by adding an external support to the rod. The simplest method would be to make dense intermediate wraps. I noticed soon that this was too painful for me and changed to a spiral continuous wrap using silk or a very thin monofilament with a varnish coating. This has helped to avoid to break the hollow rods.

In addition to support the structure, does the intermediate or spiral wrap increase the longitudinal and circular stiffness of the rod? This is a frequent dilemma of bamboo discussion boards. To answer this I made the following very simple experiment.

Experiment:

To make a simple "hollow rod" I took thin birch plywood with thickness of 1,5 mm. I cut three strips with width of 12 mm and glued them to a triangle hollow tube of 140 cm in length using 30 min epoxy. I added a layer of paper masking tape ("painter's tape") to the rod surface to make it a more solid and some cork to both ends inside the tube. This was the "rod".



FIGURE 1: triangle hollow beam



FIGURE 2: measurement of bending (rod with spiral wraps).

Next I measured the bending of the rod using modified "common cent method". I fixed the rod to horizontal position and set a mass of 30 European 5 cent coins (120 grams) to the other end. I measured the amount of bending in all three directions of the triangle.



Thereafter I measured the twist, the circular bending of the "rod". I made a simple plywood plate with a triangle hole and put the same weight to measure the twist to clockwise and anticlockwise again in all three positions of the rod resulting in six measures together.



Figure 3: Measurement of twisting (rod with a spiral wrap)



*Figure 4 : Twisting of the triangle beam
(here with the spiral wrap)*

Thereafter I made the circular continuous spiral wrap to the "rod" using UNI thread. I chose black color for clarity. Then I wiped a thin layer of 30 min epoxy to keep the thread fixed to the surface.

Thereafter I repeated the measures, bending and twist of the rod in all directions and measuring the change of the shape.

The results:

The longitudinal stiffness of the rod in bending test did not change or increase significantly, the mean difference was only 1%.

The mean tendency to twist decreased by 11% measured in all six positions and directions.

Conclusion:

The external support using the continuous spiral wrap has some effect on the physical properties of a hollow tube like hollow build rod. The effect on the longitudinal bending seems not to be significant in practice.

The effect to the circular bending like twisting during spey casting seems to be more significant and perhaps useful. What is more important the effect certainly would protect the hollow rod to broke or "explode" in normal use. This has been my experience when using long and eg. two hand hollow build salmon rods.

I cannot compare the effect of my spiral wraps to internal bridges. As the spiral wrap is very easy to obtain it is an attractive and easy alternative option to internal bridges in hollow building.

This experiment was a simulation of a rod but I hope that it gives us some knowledge for the real cane rod building.