# The Making of a Willow Trefoil Knot

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## Abstract

Every spring I make objects from fresh willow. Willow provides flexible twigs which can be used for braiding and knotting. Knots are useful and decorative elements in wickerwork, but what if the knot itself becomes the object. This paper handles my process of making a willow braided trefoil knot.

**Figure 1**: *Wickerwork of a trefoil knot, this is a model for a larger version.*

Wickerwork is an ancient craft, at which I am self-taught. My motto is: look, think, do! For me, reinventing the wheel is the best way to understand the material and the construction. Willow is suitable for making large objects without the need for much material. For my objects I use naturally grown willow that I find in the landscape. There are more than a hundred species of willow and many are useable but just a few are perfect for wickerwork. Fresh Belgian red willow is incredibly flexible. Unfortunately, the beautiful yellow-orange-red colour turns into an inconspicuous brown after a few weeks.

## Willow knots

In recent years I have made many knots and discovered how strong and flexible willow twigs are. I use a knot to connect two or more thicker twigs: together or as a bundle. Knotting with willow is not that difficult:

in principle it is the same technique that is used for rope. The advantage of willow twigs over rope is the thin pointed top that acts as a needle. It can be easily inserted in the openings of the windings and pulled through. The thighter the knot, the better it holds, because after a while the twigs shrink slightly and loosen.

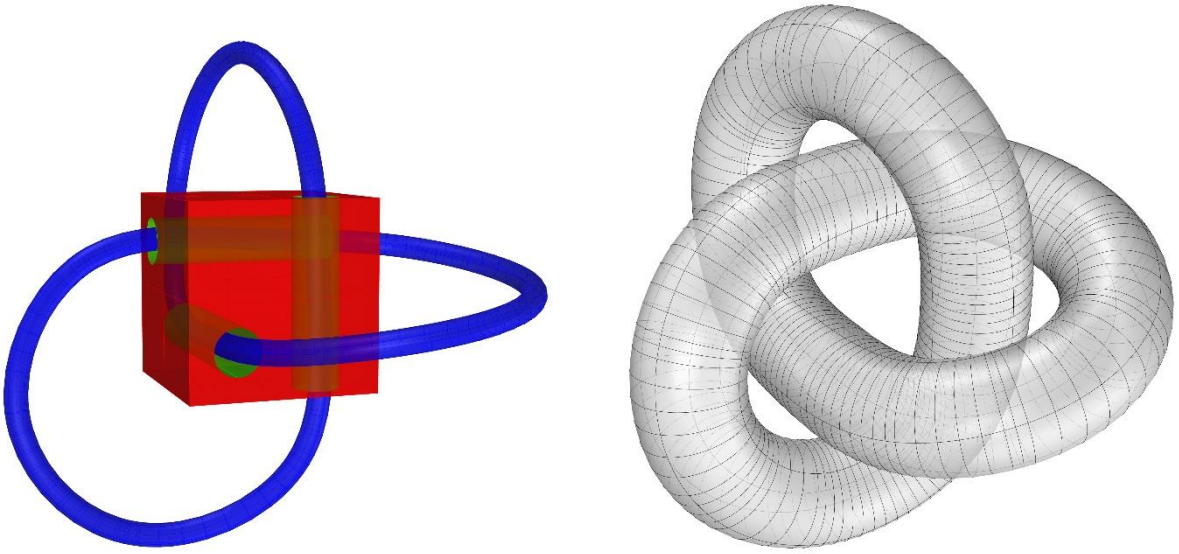
To my opinion an extensive knowledge of knotting is not required, as feeling and skill are developed while practicing. A good knot is primarily a functional knot, but knots can also have a decorative value. The structure of the windings and colour invite all kinds of variants (Figure 2). A knot turns into an interesting object by extending it with multiple windings in a specific overlapping structure. Even chaotic knots can be beautiful. A knot might not be instantly firm, and instead of starting again, more windings can be applied until it feels strong enough! Natural materials such as willow are not equal in shape and tension and it requires 'Fingerspitzengefuhl'.

**Figure 2**: *All kinds of knots including a chaotic knot (right below) made with flexible willow twigs.*

## Infinite knot

Last winter I came across the image of Escher's woodcut 'Knots' (1965) [1] and I wondered if it would be possible to make this looped knot of willow. To be able to braid the knot, it must be translated into a smooth tubular shape. That would certainly be a challenge because normally the shapes of my objects are somewhat unpredictable. Wildly grown willow has its own will, and to make sure it looks like a tubed knot it is important to preserve the right shape.

To understand the specifications of such a shape I first studied Escher's woodcut. The artwork shows the rotation of the knot in perspective in three ways. He uses an open-worked, squared pipe, a curved beam with right-angled ribs and a solid tube. Secondly I started drawing the knot with 3D-computer software. A cube is a good starting point because of the clarity of the three dimensions: length, depth and height (Figure 3a). Each loop makes a turn from one dimension to the other. By using the right-angles of the cube the knot became rather angular. After shortening the curves the line became more smooth (Figure 3b).



(a) (b)

**Figure 3**: *3D-designs of an trefoil knot: (a) as a rope through a cube, (b) as a tube based on a cube.*

## Limitations of willow

The easiest way to get an idea of the difficulties that arise when braiding a tubular trefoil knot is to make a model. First I made a template: a simple board with nine holes in a circular shape. I put nine uprights in those holes and start braiding the tube. The first loop makes a bend of 270 degrees with a diameter large enough for the tube to run through the loop at the next bend (Figure 4a). The third bend connects with the start (Figure 4b). The braiding was a quite a struggle; although willow is flexible, in the curves there is hardly enough room for bending the twigs without buckling. Because of the strength of the construction the uprights are thicker and therefore quite sturdy. The model was finished succesfully but is it possible to make a larger version?

(a) (b)

**Figure 4**: *Braiding loops: (a) second loop through first loop and (b) third loop is closing the knot.*

One only knows the limitations of material when pushing the boundaries. I had to start again when the tube collapsed midway on a weak spot. On the transition from the first to the second loop the tube had become somewhat flat and new posts were also inserted there. To be able to braid the next loop, I tilted

the object but stretched it too tight to the work table to hold it in position (Figure 5a). So my working plan needed to be adjusted for the next attempt. This time I used fewer uprights for the same diameter of the tube, so that the twigs had more space. This reduced the tension and the chance of collapsing. The shape became more manageable. Secondly, I also ensured that the diameter of the tube remained as constant as possible. And finally, I had to make the bend from the first to the second loop more smooth (Figure 5b). It is quite difficult not to lose orientation in space while braiding and controlling these aspects at the same time.

(a) (b)

**Figure 5:** *(a) First attempt buckled due to a weak spot in the tube, (b) second version with smooth loops.*

## Summary

Willow allows one to make wire-like objects that show structure and construction. But tension and force is needed to get the twigs in line. This inherent energy is reflected in the object. To obtain this effect the tube must be forced into the correct bend during the braiding process.

## References

[1] '*Knots*', official website M.C. Escher, M.C. Escher Foundation and The M.C. Escher Company: https://mcescher.com/lw-444/.