

Contact Fire Poi Math

The globe knot equation, courtesy of John Allwine, is as follows:

$$d = \sqrt{\frac{p^2 w^2 F}{\pi}}$$

d = the diameter of your core
p = the number of passes
w = the width of your cord
F = the number of facets

$d = \sqrt{\frac{(p^2) \cdot (w^2) \cdot F}{\pi}}$
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I started by knowing that I wanted to get as close as possible to the size of my 90mm (3.5") practice poi.

I researched the different widths of Kevlar rope on the market, and the thinnest I could find that's readily available is 1/4".

Globe knots are weaved over and under each other, so lying flat, the thickness would be two layers - double the width of the rope. This means that the spherical knot would add four times the thickness of the rope to the total diameter (two layers on each side of the sphere).

1/4" * 4 = 1", so the kevlar would add 1" diameter to the wooden core that the knot tightens around. So, if I wanted a 3.5" total diameter, I'd need a 2.5" (65mm) core. I could only find 60mm and 70mm wooden balls on eBay, so I went with 60mm (2.36") ones, which would yield a head size of 3.36" (85mm).

For the number of passes (i.e. the number of times the knot is followed through itself, i.e. the number of rope pieces visible on each square (facet) of the knot), John Allwine recommended trying three. (This filled in the knot satisfactorily, but there was room to squeeze in a fourth pass, which I'll probably try next time I do this build.)

Based on the variables from the equation, I had the following:

$$d = 2.36''$$

$$p = 3$$

$$w = 0.25''$$

$$F = ?$$

I then solved for F (the number of facets):

$$F = (d^2) * \pi / (p^2) / (w^2)$$

$$F = 5.5696 * \pi / 9 / .0625 = \mathbf{31}$$

The ideal number of facets for the knot was thus 31. There are certain numbers of facets that work better than others for globe knots, 30 being one of them, so I rounded down to that.

Once I had all my inputs, I followed John Allwine's [tutorial](#) for entering them into his [Advanced Grid Maker](#) web app, which produced the [knot template PDF](#) included in the [Instructable](#).

I also checked the bottom section of the Advanced Grid Maker for the rope length required for one passthrough:

Rope length (given by Advanced Grid Maker) = 5'5.54" (166.5cm) * 3 passes = 16'4.62" (499.4cm) + 10% extra for workability = **18'** (5.5m) per head

For the mandrel, the diameter should be the same or larger than the diameter of the core.

That should cover my process - hope it all makes sense. Feel free to contact me at havepoiwilltravel@gmail.com if not. Happy modding!