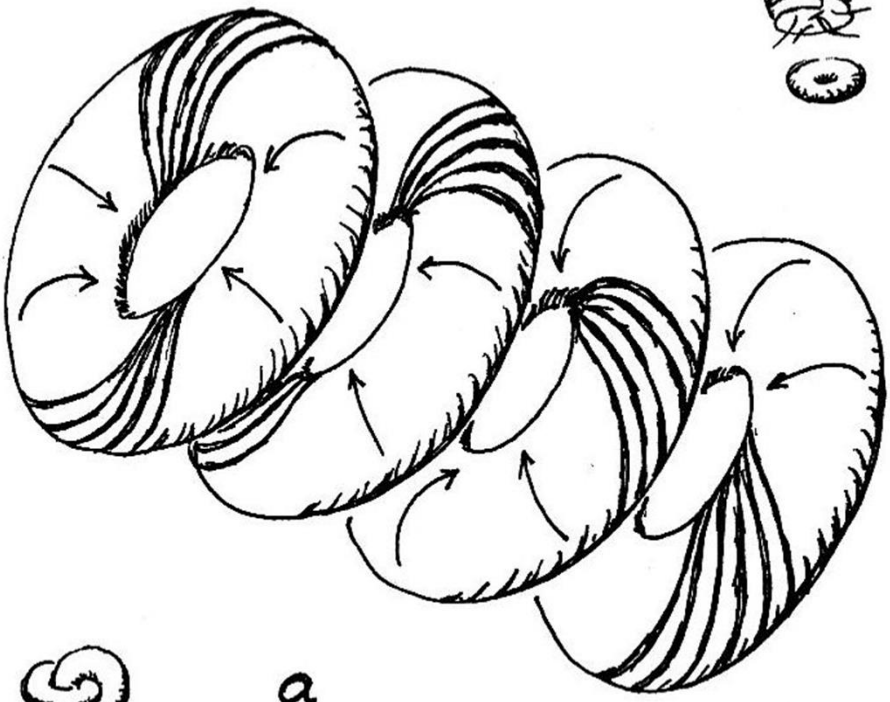
How to crochet



a

Rolling Torus

by

Anneke Mejer-Treep

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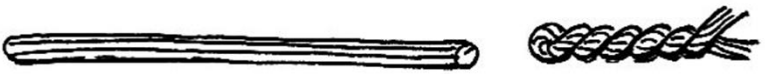
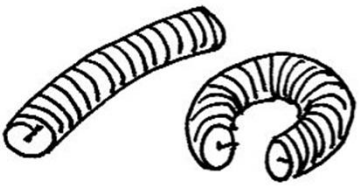
Introduction

August 11, 2024

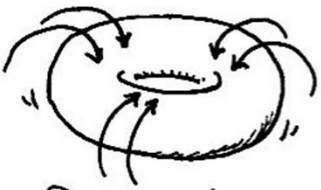
When I first started modeling twine strings using crochet, I never expected to spend hundreds of hours crocheting toruses.
For twining, I needed my models to be longer rather than shorter:



At some point though, I realized that the techniques I had developed for these elongated models could also be used for creating toruses - not the static type I had made earlier, but this time also allowing rotation around the circular axis!

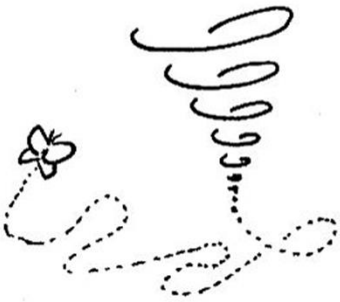


Static torus



Rolling torus

This rolling motion gives a Rolling Torus its name and makes it particularly satisfying to handle.



Even more fascinating is how a tiny variation in a pattern can have a large overall effect on the outcome! That's what got me hooked on making toruses for such a long time, and led me to write this booklet.

With it, I hope to bring others that same sense of joy and wonder. By sharing my techniques and notation, I also hope to provide a common basis for recording and exchanging patterns and further explorations.

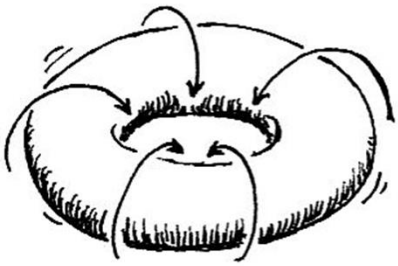
Have fun and enjoy!

Anne

April 1, 2024

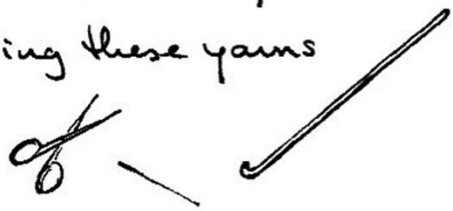
Crocheting a Rolling Torus (1)

Yes! You can crochet a Rolling Torus - a torus that allows rotation around its internal, circular axis.



What you need...

* A skein of thicker yarn
* A selection of thinner, coloured yarns
* Crochet needles suiting these yarns
* A pair of scissors
* A darning needle
* Scrap yarn ends in different colours to use as 'guide lines'



... and what you need to know

Making a Rolling Torus does not require any super-advanced crochet skills. More important are diligence and accuracy!

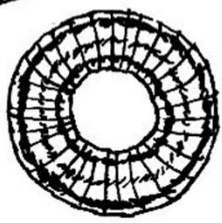
It also involves some special techniques and notation, which I introduced for crocheting twine string models. If you're not familiar with these, please check out the Techniques and Notation chapters before reading on. Thanks!

Now we can turn our attention to the actual making of a Rolling Torus:

1) First, form a chain of the desired length;
2) Crochet the cylindrical body by adding rows and increasing the number of stitches;

3) "Stack" the windings and check for irregularities;
4) Bring the ends together and connect them to form the toroidal body;

5) Add coloured lines to connect the windings and stabilize the overall shape of the torus;



6) Remove any guide lines and finish off.

Crocheting a Rolling Torus (2)

May 19, 2024

That doesn't sound too complicated, does it?

In practice though, you'll likely find that while the crochet techniques used may not pose too much of a challenge, your counting and finishing off skills may need some honing!

Even after having completed lots of toruses, I still sometimes end up with a stitch too many or too few, leaving me with no other option than to undo part of my work.

To avoid such moments of setback, I now use 'guide lines' a lot.

In fact, they've become such an essential tool that I've started to include them in my pattern notation.

See the chapter on guide lines for a detailed discussion.

For our first Rolling Torus we'll use the pattern
Ch 84 D4 GL3 W12 TØ L6

This notation basically describes what to do at each stage outlined above:

Ch 84 — start with a chain of 84 stitches.

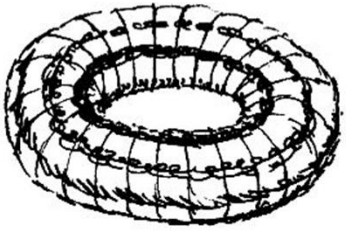
D4 — on the next row, make four double stitches in each chain stitch, giving a rim of 84 · 4 = 336 stitches,

GL3 — do so using three guide lines.

W12 — indicates we want to end up with twelve stitches per winding. With 336 stitches, this means we'll get 28 windings.

TØ — tells us to connect the ends of the body in a straightforward way, i.e without twist ('zero twist').

L6 — indicates we'll add six coloured lines.



Crocheting a Rolling Torus (3)

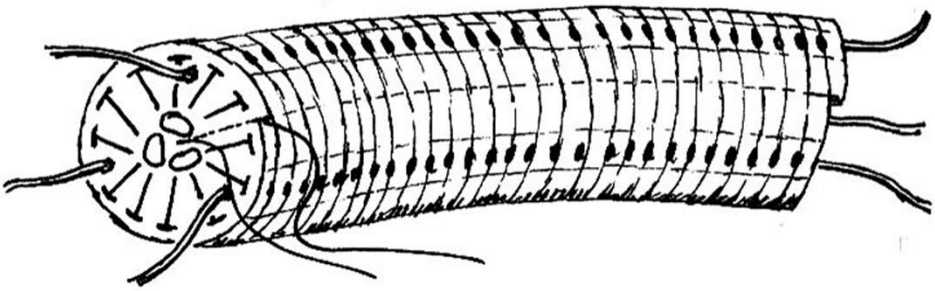
June 16, 2024

Do you have everything you need at hand? Then let's get started and go over each step in more detail.

1) Ch 84 i.e. crochet a chain of 84 stitches. Allow a tail of 10-15 cm before making the starting loop, which counts as the first stitch. Make your stitches such that they'll hold the four doubles in the next step snugly.

2) D 4 tells us the next row consists of four doubles in every chain stitch (only, in the first one we'll make three since we also have a stitch going 'up' at the start).
GL 3 suggests we use three guide lines. For these, take differently coloured lengths of yarn. Insert
- the first after the second double;
- the second after the sixth double;
- the third after the tenth double.

From there, align your spiraling work to cycle through these until you've completed all 28 windings.



3) W12 In other words, "stack" the windings so that they have twelve rim stitches each. The guide lines facilitate this - just slide the windings close to each other along them.

Now, make sure your work passes the "Corn on a cob" - test. When you feel confident that all is well, you can cut off the working end (again leaving 10-15 cm) and continue with the next step.

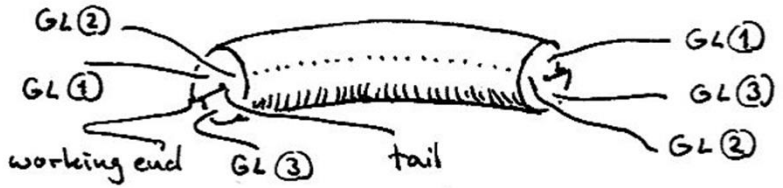
Otherwise, you'll need to find out how to fix the problem (or undo part of your work).

Crocheting a Rolling Torus (4)

May 7.2024

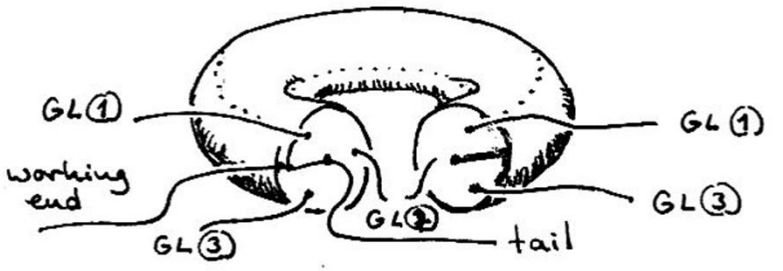
At this point, you have a Ch 84 D4 W12 body with various loose ends:

- Two loose ends for every guide line;
- The 'tail' (where the work started), coming from the central chain;
- The 'working' end of the last stitch.



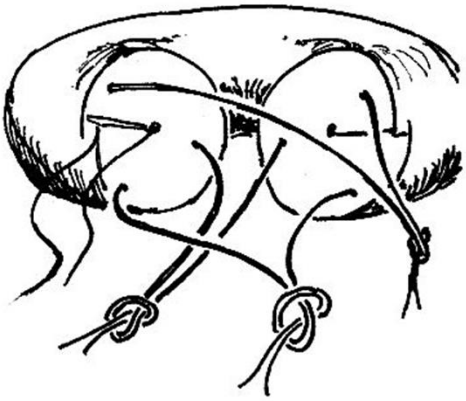
4) The next step is to bring the body's ends together and transform the cylindrical body into a toroidal one.

TØ means we'll do so without torsion, i.e. the guide lines all run level through the body:

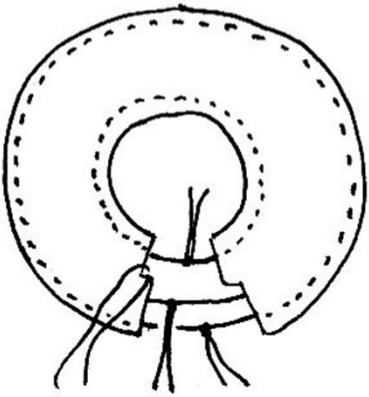


The actual connection will be formed using the 'tail' and 'working' ends. But first, we tie the guide lines into circles so the ends stay aligned nicely.

Here, it helps if you've used distinct colours for the guide lines - then you easily see which ends to tie together. using a two-strand overhand knot. Leave a bit of room so the torus can move freely and even rotate around its circular axis.



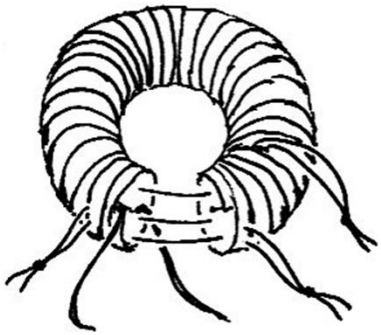
Spread the windings a bit and distribute them somewhat evenly over the full length of the guide line loops, yielding this top view:



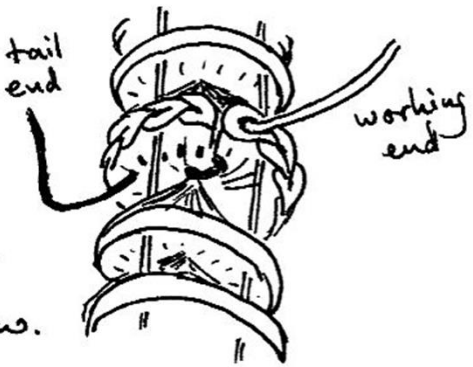
Crocheting a Rolling Torus (5)

May 20, 2024

In order to get a better view of the 'tail' and 'working' ends, it helps to move the knots out of the way. Just gently pull them through three or four windings either way.



Now, at last, we can join the body's ends and form a torus. First, thread your darning needle with the tail end and connect the centers of the ends firmly, yet without thickening the core. Then connect the first and last windings with a small stitch just below the rim and run it through a couple of edge stitches as invisibly as you can. Leave the end for now.



Then thread your needle with the 'working' end to connect the rim of the first and last windings, again as invisibly as possible. Make sure that the number of rim stitches between the first and last guide lines matches the number of stitches between any other pair of guide lines (four, if you used three guide lines).

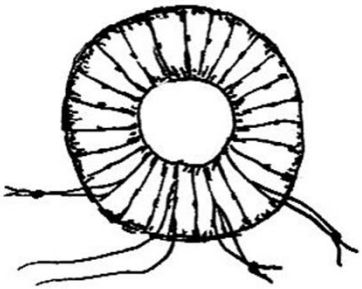
If the windings still don't match up neatly, add a little stitch just below the surface before finishing off the working end as well.

In doing all this, take care not to fixate or catch any guide line. They should all still run smoothly through the body.

May 14, 2024

Crocheting a Rolling Torus (6)

Congratulations!
Connecting the two ends neatly may be one of the hardest steps to master.

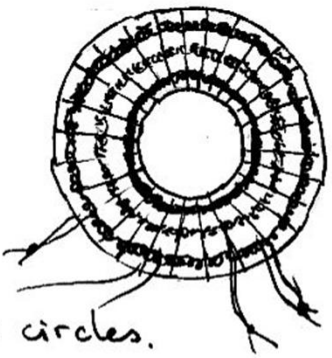


Your Rolling Torus should looke pretty toroidal now, with just various ends hanging out. Even so, you should be able to let it roll already!

Note how the guide lines stabilize it; we'll leave them in until all coloured lines have been added in the next stage.

5) ⊿6 indicates that we want to adorn our torus with six coloured lines, so take your pick from your thinner yarns. With windings of twelve stitches, six lines will give you a stable torus with a nice view on its inner structure.

We'll add the six coloured lines parallel to the guide lines, thus connecting all 28 windings with six circles.



Clearly, the outer circles are longer than the inner ones. Thus, if we want our Rolling Torus to roll smoothly, we'll need to allow some slack in the connections between the windings.

We do this by adding in a chain stitch between the double stitches that go into the rim stitches of two consecutive windings:

o Chain

T Double

In other words, we loop around, alternating

- a double stitch in a rim stitch
- a chain stitch

Crocheting a Rolling Torus (7)

May 15, 2024

Start your first coloured line by making a stitch on a rim stitch next to one with a guide line running under it.
Then work your way around, staying parallel to that guide line at all times, until you end up where you started.
Cut off the working end to connect the first and last stitches - invisibly of course!
Leave the ends until you've completed all six coloured lines (circles).

For the second coloured line, do the same, just two stitches further along the rim.
You'll find this line will again run nicely next to a guide line.
Add the remaining lines in a similar manner.

Once you have completed all six circles, your Rolling Torus is almost ready.
In the last stage, we only have to remove the guide lines and finish off:

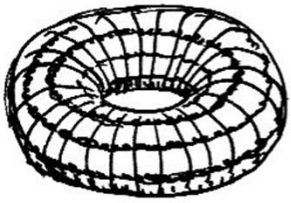
6) Make sure one last time that all coloured lines run parallel to each other.
Then gently remove the guide lines. Use your crochet hook to pull them up at the knot, cut them, and slowly pull them out.

Finally, finish off all loose ends as neatly as possible. In doing so, make sure you don't hinder the rolling motion. With the guide lines out of the way, you may find it convenient to hide some ends in the very core of the torus.

Techniques and Notation

July 14, 2024

The following chapters will cover a number of topics common to crocheting twine string models and rolling toruses (or tworuses).



Since both types of projects are made by first crocheting a spiral of windings and then connecting these by their rims, we'll start with a review of the basic models from "Nature of Twine Strings, part II" before discussing the various techniques in detail.

In short, you'll find chapters on:

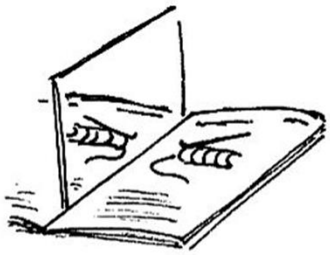
* Instructions and notation for making a 'body', where you'll learn how to read "Ch 72 Tr 4 D2 W12" as a pattern.

* The use of 'guide lines' while making such a 'body'.
* The "Corn-on-a-Cob" check to see if your work has come out as planned.
* How to add 'coloured lines' in different ways.

and possibly more.

Hopefully. these chapters will prove a valuable reference while working on your projects.

If you're already into crochet, you may know that names and notation for crochet stitches may differ between continents and countries; I intend to always use British notation.



Another good thing to know is that I work right-handedly, so most sketches will reflect this. Therefore, especially if you're left handed, a mirror might come in handy to view them in a way that better matches your own work.

Basic Twine String Models (1)

September 15, 2024

Before you get started on your first Rolling Torus, you may like to familiarize yourself with most of the required techniques by making two simple yet illustrative models from "Nature of Twine Strings part 2":

As small as they are, these similar-looking but structurally different models offer a first view of the intriguing shape changers involved in twining fiber bundles.

By making these models you gain crochet-technical experience as well as a feel for the bending and twisting motions.
You can explore the effects of their structural differences by making both models from the same types of yarn, or find out which types of yarn work best by using different ones.

These are the two basic twine string models:

A: Ch 48 Tr 6 W12 ⌐6

B: Ch 72 Tr 4 W12 ⌐6

which both yield a model of 24 windings with 12 rim stitches and 6 coloured lines.

The patterns are read as crochet instructions as follows, taking A as an example:

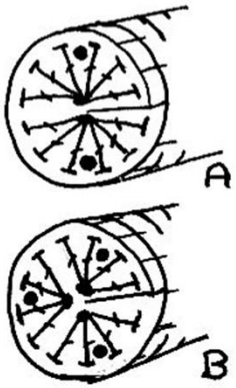
Ch 48 make a string of 48 chain stitches;

Tr 6 then make a row of treble stitches (Tr), placing 6 in every chain stitch;

W12 'stack' the windings so they all have 12 rim stitches;

⌐6 connect the windings with 6 coloured lines, spaced evenly.

Note that at the time, patterns did not mention guide lines; I suggest using two for pattern A and three for B, matching the groups of trebles.

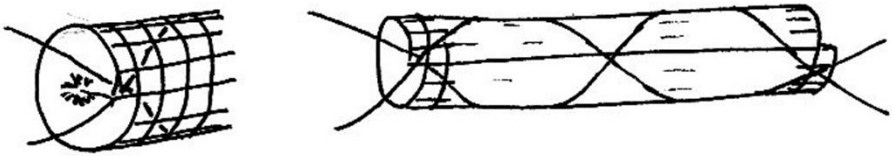


Basic Twine String Models (2)

September 18, 2024

Once the body is ready, remove any guide lines and finish off the ends to prepare for the next step.

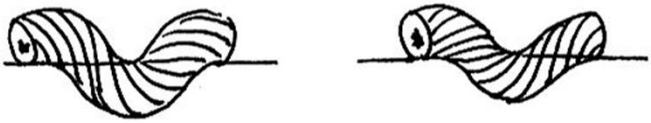
Now, take your darning needle to thread two fairly long ends of yarn "diagonally" through the rim stitches. Both should enter the first stitch of the first winding; from there, one should run "with" the windings, the other "against" them:



Make sure both lines run smoothly and do not intersect. Now the model is ready for action!

Slowly pull one of the lines taut and watch the model change shape. Isn't that amazing?! (If you have no model at hand yet, try visualizing this in your mind's eye.) Then, pull the other one taut instead...

I just love the interplay between the coloured lines and the lines being pulled taut, and it continues to amaze me how this creates the combination of twist and twine for a single fiber bundle.



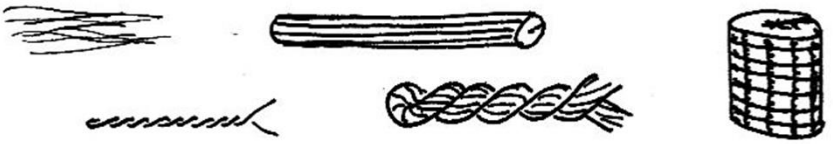
Back to the Rolling Toruses.
Surely you can see how making the basic twine string models sets you up for success in making Rolling Toruses. Now you just have to get good at connecting the body's ends...

Once you're satisfied with making your basic Rolling Toruses and start making variations, you may actually find twine-like shapes appearing again!

August 4, 2024

Notation (1)

When I first started modeling twine string using crochet, I sought to create "strings" with more body than the thin fibers of linden bark that had inspired me.



Experimenting with different numbers and types of stitches and models of different lengths and diameters adorned with coloured lines helped me see how twist and twine interplay and create patterns.
Before I knew it, I had so many models that I felt a need to keep track of how I made them. That's where the shorthand notation for the crochet patterns for the cylindrical 'bodies' came in.
These early patterns consisted of instructions

for the following:

- the length of the starting chain;
- for each of the following rows: the type and number of stitches to make in every stitch of the previous row;
  E.g. D2 means two double stitches and Tr 6 means six treble stitches
- the number of rim stitches we want per winding
- the number of coloured lines used to connect the windings.

Thus, the pattern Ch 72 D2 D2 W12 L6 can be read as follows:

Ch 72	start with a chain of 72 stitches
D2	1st row: make two doubles in every chain stitch
D2	2nd row: make two doubles in every stitch of the previous row
W12	align the windings so they all have twelve rim stitches
L6	add six coloured lines

Notation (2)

August 4, 2024

Note how this notation still leaves some room for variation; for example, '26' does not specify the number of chain stitches to make between windings.
Also note that it doesn't specify any use of guide lines. Helpful though they might be, when the cylindrical body was ready, they were removed anyway.

Once I started making Rolling Toruses, I needed to extend the notation to specify:

- the (suggested) number of guide lines to use;
- the amount of twist to apply to the body before connecting the ends;
- whether to let the coloured lines run over the body in the lengthwise direction or at an angle. Can you see why this was not an issue for the cylindrical models?

The pattern Ch 72 D2 D2 GL 2 W12 TØ L\+1 then describes a Rolling Torus as follows:

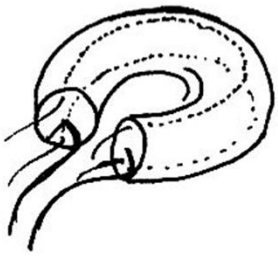
Ch 72 D2 D2 W12 is read as before, yielding the cylindrical body.

GL 2 after the second 'D2' suggests using two guide lines in this row - and leaving them in!

Note that for the first row, no such instruction is given. This doesn't mean you shouldn't use guide lines here, just that they can be removed after completing that row.

Next, we get to the instruction for applying twist to the body before connecting the ends.

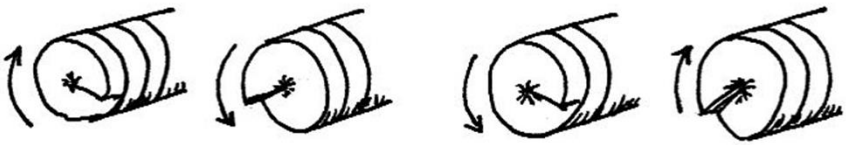
TØ indicates 'no twist' or 'zero twist': the guide lines run level through the toroidal body.



Notation (3)

August 4, 2024

In the case we do apply twist, we look at the direction in which the windings spiral; to go in that same direction we 'add' twist, making the body tighter (and longer), while 'negative' twist makes the body a bit looser (and shorter). Note that it makes no sense defining twist in terms of 'clockwise' or 'anticlockwise', since the direction of the windings depends on the left- or righthandedness of the crocheter.



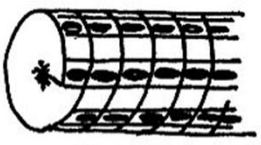
adding twist removing twist

T1 (or T+1) thus indicates adding one full turn of twist to the body.
For more turns, we write T2, T3, etc.

T-1 similarly describes removing one full turn of twist, T-2 two turns, etc.

So far, a pattern's last instruction just tells us how many coloured lines to add, e.g.

L6 six coloured lines, running lengthwise, spaced evenly.



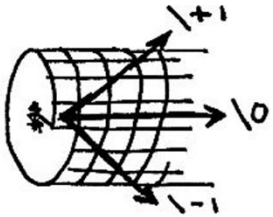
W12 L6

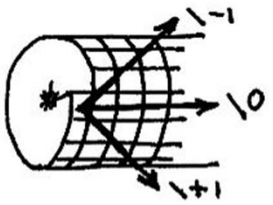
Now we extend this notation to include adding lines 'at an angle'. We do this by appending a '\' followed by either '+1' or '-1' to indicate where to go on the next winding:

\0 (which we leave out) would mean: go to the corresponding rim stitch;

\+1 go to the stitch <u>following</u> that corresponding stitch;

\-1 go to the stitch <u>before</u> it.





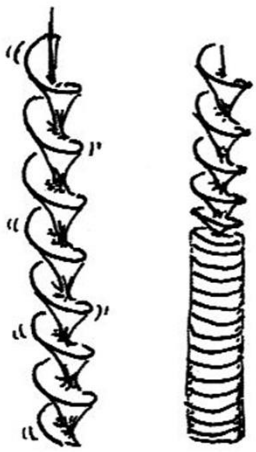
As you see, the actual direction depends on the handedness of the spiral of windings!

Regarding Ch 72 D2 D2 GL 2 W12 TØ L\+1, can you see why we can simply write 'L\+1'?

Technique: a 'Body' of Windings (1)

July 20, 2024

The body of a twine string model or rolling torus is crocheted in the same way as a 'windspinner' – a hanging decoration that will whirl in the wind.



For both, you start with a string of chain stitches and then add one or more rows with lots of increases, causing the work to spiral.

While a windspinner's windings hang loose, for a 'body' we stack them close together; thus they form a fairly solid object whose surface consists of the rim stitches of the respective windings.

I recommend using guide lines for initial stability. Later, coloured lines are added to actually connect the windings.

The pattern for a body is given by a series of instructions, such as "Ch 72 D2 D2 W12", telling you what kind of stitches to make in each row (and how many) and how to stack the windings.

The example "Ch 72 D2 D2 W12" thus has four instructions:

Ch 72 start with a chain of 72 stitches;

D2 a second row with two doubles in every chain stitch;

D2 a third row with two doubles in every stitch of the previous row;

W12 stack the windings so they all have twelve rim stitches.

The resulting body will then have $72 \cdot 2 \cdot 2 = 288$ rim stitches, giving it $288/12 = 24$ windings.

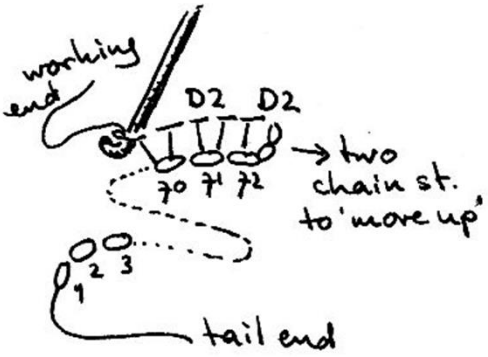
Technique: a 'Body' of Windings (2)

July 24, 2024

Arriving at the correct number of rim stitches can be a bit tricky, especially if the pattern involves multiple rows of increases.

This is caused by the fact that in order to 'move up' for the next row, we need one or more chain stitches.

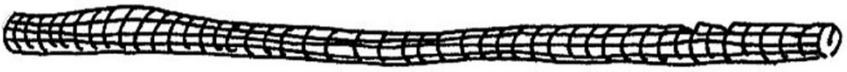
Shown here is how these chain stitches actually serve as the first double of the next row.



A similar situation arises as we move up to the second row of doubles.

As long as the first row of doubles has $72 \cdot 2 = 144$ stitches, you should be able to handle this next 'move up' in the same way, and end up with the desired total of $144 \cdot 2 = 288$ rim stitches. Clearly, this story repeats for patterns with more rows of increases.

Getting the numbers right is important since the surface of rim stitches will serve as a lattice to work on later. Any irregularities in this lattice may cause the end result to bulge, have weak spots or just look unorderly.

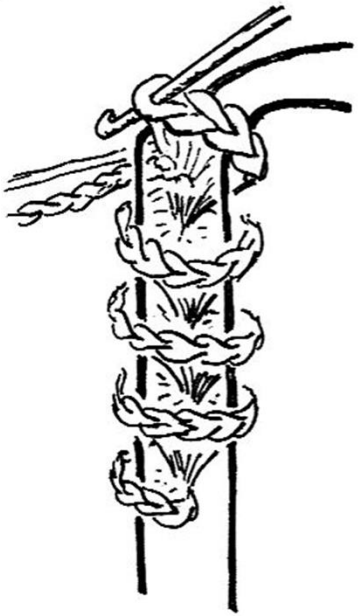


To make counting easier, we can insert 'guide lines' as we go. These temporary aids will not affect the end result but make the lattice more readable while we work on it.

Taking our example, we might write:
"Ch 72 D2 D2 GL 3 W12" to indicate we want to end up with three guide lines running through the windings with twelve rim stitches. During the last row of doubles, this requires us to insert them every 12 / 3 = 4 stitches.
See the chapter on guide lines for more detail.

May 9, 2024

Technique: Guide Lines (1)



What are 'guide lines'?
These are lengths of yarn that you insert into your work at regular intervals, without making them part of your work.
In fact, once a guide line is no longer needed, you should be able to pull it out easily.

Why insert guide lines?
Because they make crochet life so much easier!
They facilitate:

- Counting stitches and/or windings;
- Aligning windings;
- Checking for mistakes;
- Adding coloured lines.

Generally speaking: guide lines keep you on the right track!

Guide lines may also support

- Dynamic actions, changing a model's shape;
- Fixing a model's shape, e.g. by tightening the inner 'tradi' of a twine or (twisted) torus.

If you're still not convinced of their value, just try going without...

What yarn makes good guide lines?
Basically, any (scrap) yarn might do.
When I have a choice though, I prefer:

- using ends of different colours, so I don't confuse the ends of different guide lines;
- colours that contrast with the 'body';
- smooth, strong yarn;
- having them long enough - otherwise they may accidentally get pulled out, even partly. That's *SUCH* a nuisance!
  For starters, I suggest taking the length of the central chain + 20 cm on either side.

If you save your scrap yarn ends, you'll soon have plenty of choice.

Technique: Guide Lines (2)

May 9. 2024

How many guide lines do you need?
If you're new to this, just start with a single guide line to get used to inserting it. Even that single line will save you lots of time (s).
Otherwise: it depends on the pattern - especially on the number of stitches per winding. You'll want at least two to provide some stability and make counting on either side easy.

D4 W12
three guide lines

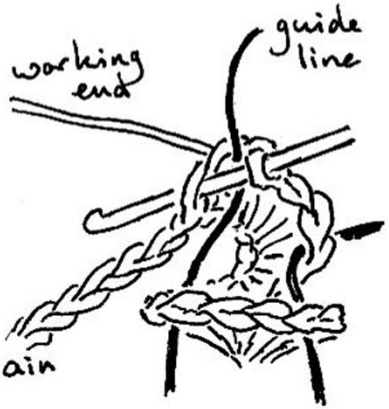
Tr 6 W12
two guide lines

D3 W12
two guide lines

I prefer them to be at least four and at most six stitches apart, but more importantly, they should fit into the flow of your pattern.
E.g. D4 W12 "asks" for three guide lines, four stitches apart, since your windings consist of three groups of four doubles. And similarly, Tr 6 W12 "asks" for two, six stitches apart.

How to insert a guide line?

Just place the guide line over the working end, under the crochet hook. Push it right up against the previous stitch. Then, making the next stitch, it will get 'caught' underneath.



Where to insert?

In every winding, every guide line should get inserted once, and always in the same order.

Clearly, you can insert a guide line after every group of stitches. e.g. for D4 after every group of four doubles.

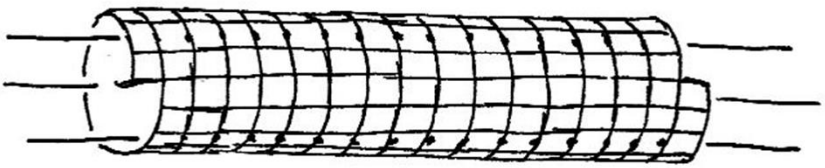
When you're making a torus, this means you might end up with a gap between the first and last windings that needs a guide line. This is somewhat awkward, so I tend to try and avoid it. For D4 an alternative is to insert the guide lines in the middle of the groups.

April 27, 2024

Technique: the "Corn on a Cob"-Check

Whether you're making a twine model or a torus, you'll want to ascertain that your windings line up nicely and that they all have the same number of rim stitches.

Your chances of catching any mistakes early increase a lot by using multiple guide lines. Clearly, they help you keep track of the number of stitches as you're making them. Then, once the 'body' is ready, they facilitate a visual "Corn on a Cob"-check; I call it



that because it reminds me of the way corn seeds are aligned on a perfect cob in neat rows and spaced evenly.

Once you've completed the second step of your

pattern (the 'body'). you can pull the guide lines taut and shift the windings close together, so that the result resembles a corn cob.

This allows you to easily do some checks:

* Do all guide lines run parallel to each other?
* Do all guide lines run through every winding once?
* Do you have the desired number of windings?
* Do the leading stitches of the first winding (i.e. those running up to the first guide line) and the trailing stitches of the last winding match up to give you a whole number of windings?
* Do all windings have the same number of stitches? Look at the "cob's surface from different angles and carefully check any irregularities:

July 1, 2024

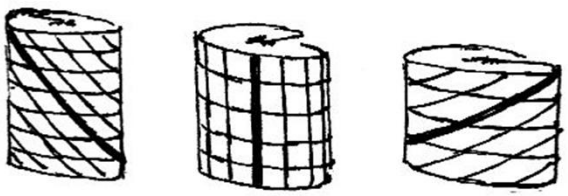
Technique: Coloured Lines (1)

A 'Coloured Line' connects the rims of consecutive windings in a systematic way.

It is made by connecting the corresponding rim stitches of the consecutive windings using

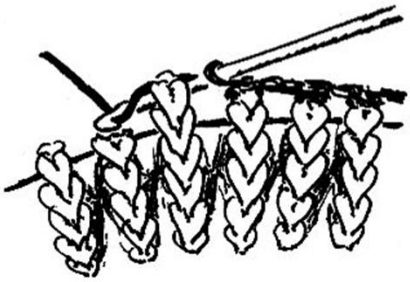
- a double stitch in a rim stitch
- followed by a (fixed) number of chain stitches as you move along the body.

Originally, the lines just served to fix the number of stitches per winding and thus stabilize the body. Then, different colours were needed to identify individual lines when studying the twist applied to a model:



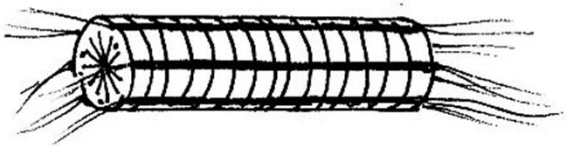
On a cylindrical (twine string) model, just start with a double stitch in a rim stitch of the first winding. Starting next to a guide line will help you pick the correct rim stitch for each winding.

Working 'upward' from the first winding, I always enter the rim stitch 'from below':



After the double stitch in the last winding, add one chain stitch before cutting your yarn. Leave the ends for now, just in case you discover a mistake later on and need to undo some work...

Use the guide lines to help you determine where the other coloured lines should go and complete them in a similar fashion.



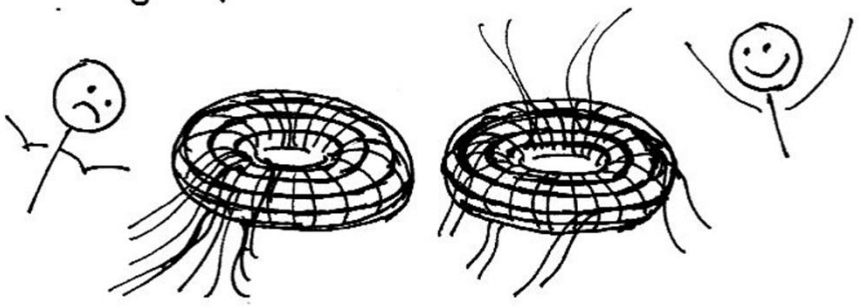
Once all are in place, finish off the ends.

July 4, 2024

Technique: Coloured Lines (2)

On a toroidal model, we do almost exactly the same, but now every coloured line will end up on itself (if we stayed parallel to the guide line, at least).

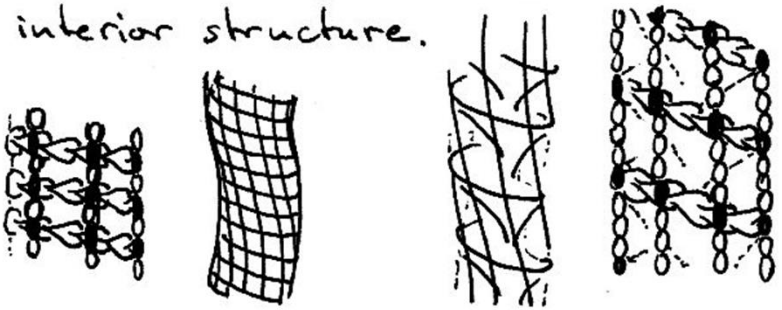
In order to not have all loose ends end up on the same winding, I reccommend starting adjacent coloured lines several windings apart.



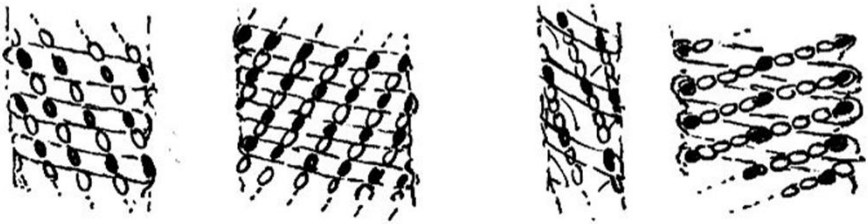
How to best finish off these loose ends, I leave up to you.
Depending on the colour contrast and the kind of yarn, you might hide the ends in the coloured lines themselves, or in the innards of the body. See what works best for you.

With the basics of adding coloured lines under your belt, you're ready to roll!

Play with different kinds of yarn and different numbers of chain stitches between windings; the results can range from tight models that retain their general shape to very loose ones that allow a good view of their interior structure.



Clearly, the more chain stitches you add, the more twist can be applied in either direction.

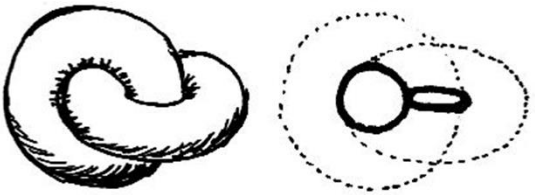


Note how the body will either narrow and lengthen or widen and shorten accordingly.

Crocheting a Rolling Twarus

July 27, 2024

Once you know how to make a Rolling Torus, you may want to try and make your first Rolling Twarus.
A Twarus consists of two toruses that fit into each other snugly - that is, they share only a boundary consisting of two circles and a point:

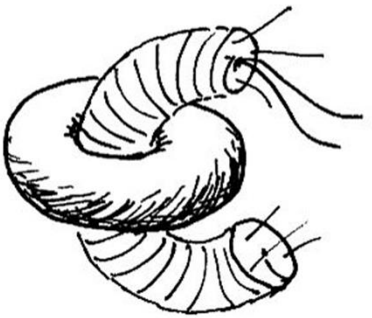


Can you see how to make one?
Note that the toruses may even have different dimensions; as long as they fit together snugly, they make a Twarus.

Before you can start, you'll need to figure out what patterns will yield two toruses that will fit together nicely, taking into account your choice of yarns, hook sizes and personal crochet style.

Otherwise, your would-be tworus may end up linked up together yet showing a gap or with a bulge at the waist...

Assuming you have found suitable patterns, you'll now have to get them to interlock.
To achieve this, you first complete one rolling torus. For the second torus, you start as usual. Then, before connecting the body's ends, you just stick one end through the hole of the first torus. That's all.



From there, you go about making the second torus as normal. Though you may sometimes need to shift it through the first one a bit, you'll find this doesn't really make things more complicated.

Rolling Torus Variations (1)

July 7, 2024

Once you've got the hang of it, you may enjoy making many more Rolling Toruses for a while...

When you've exhausted yourself (and others), here are some ways to vary and start your own experiments:

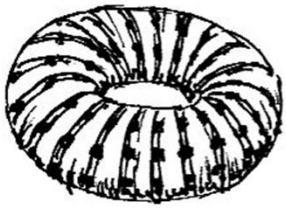
"Bare Bones"

In other words: a torus without coloured lines.

e.g. Ch 84 D4 GL 6 W12

or Ch 84 D4 GL 12 W12

See how many guide lines you need for enough stability.



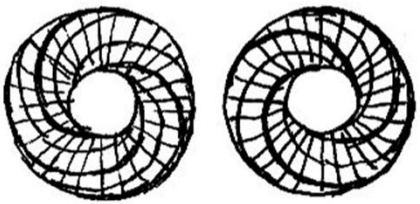
Vary the thickness and colour of the guide lines to hide or accentuate them to your liking. The trickiest part may be to make them all the exact same length, so that your torus rolls nicely and smoothly.

"Villarceau" - a torus with a twist

Here, we twist the cylindrical body <u>once</u> before connecting its ends.
We write T1 or T-1 to denote in which direction we twist:

T1 (or T+1) indicates we 'add' twist, making the windings a bit tighter;
T-1 means twisting the other way, loosening the windings a bit.

In either case, the guide lines no longer run level through the body; instead, they 'dance' up and down once as you follow them around the torus. Any coloured lines you add parallel to these guide lines will follow this pattern, resulting in Villarceau circles on your torus.



From there, try and see if T2 and T-2 are also feasible. What do you think of T3 or T-3? Where lies the limit?

Rolling Torus Variations (2)

July 26, 2024

"Fully Covered"

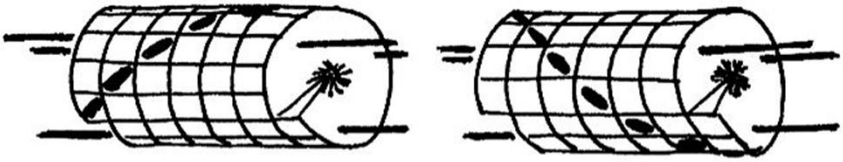
Instead of adding a coloured line every other rim stitch, we can also add one for every rim stitch (e.g. W12 L12).
This will cover the whole surface of the torus with parallel circles and mostly hide the interior from view.
Experiment with different colour schemes and types of yarn.

"Lines at an Angle"

In a way, adding coloured lines parallel to the guide lines may become a bit tedious. You may recall then how we threaded lines 'at an angle' in the basic model from "Nature of Twine Strings part 2". We can do the same when adding coloured lines!

That is, when connecting two windings, we always move over one stitch on the next

winding (and always in the same direction, of course):



This will make the coloured line curl around the torus as you go, dancing inward and outward, so you'll likely have to roll the torus accordingly as you go.

When you try this for the first time, you might be in for a surprise!

See what happens on the following bodies:

Ch 84 D4 GL3 W12

Ch 102 Tr5 GL3 W15

Ch 72 D2 D2 GL2 W12

Once you find out, try different patterns and/or vary your yarn, e.g. with graded colours or even fluffy yarn!

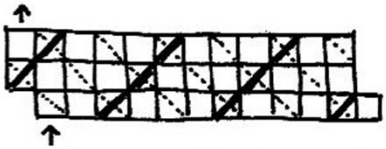
Given a pattern, can you predict the outcome for adding the coloured line 'at an angle'?

A Sense of Shape (1)

August 15, 2024

For those of you wanting to dive into the details of Rolling Torus patterns, I suggest having lots of grid paper handy.

Sketching the windings and rim stitches will help you predict and understand how the lines (especially those at an angle) will run over your torus.



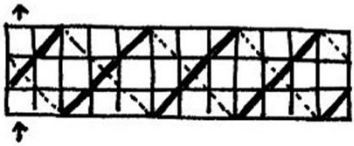
12 W3 windings with lines at an angle

The small arrow indicates how a rim continues onto the next column.

This example depicts windings of only three rim stitches, just to keep the diagram simple, even if making such a torus is not.

For more rim stitches, just add more rows, and for more windings, add more columns.

The grid paper will also help you get a feel for how this pattern differs from the "simpler" approach of a rectangular pattern that represents parallel circles of stitches rather than spiraling windings.



12 x 3 rectangle with lines at an angle

Note how the arrow now connects the top and bottom of the same column, and how the lines at an angle display symmetry over the horizontal axis.

The best way to experience the differences between the two types of patterns is by crafting them yourself: while the body of windings gives the Rolling Torus a smooth surface, sewing the rectangle's opposite sides together yields a torus that stretches on the outside and wrinkles at the hole.

A Sense of Shape (2)

August 17.2024

Thus we see that even though the two diagrams look quite alike at first sight, their conceptual differences play out at any scale, even when the single protruding square may hardly seem significant!

Once you've crocheted your first Rolling Toruses

Ch 84 D4 GL3 W12 TØ L12

and Ch 84 D4 GL3 W12 TØ L\+1,

you'll have experienced how creating a surface from a set of separate, parallel circles differs from creating a similar surface from a single long line of stitches.

I strongly feel that such firsthand experience changes our understanding of and relationship with the world around us. "The knowing is in the doing", as they say.

For me, such a moment of sensory insight occured after many hours of twining linden bark fibers into string, when one day my hands suddenly "told" me: "There's interesting math here", - something worth exploring!

Indeed so - from searching for ways to model twine string to finding how to do so using crochet, and now to discovering how to make Rolling Toruses with the same techniques - I love it all!

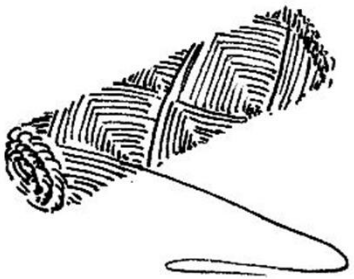
Even though I still haven't been able to formalize the elusive patterns I see in twine string, the connection to toruses seems to bring this a step closer. And also, it seems to make my research easier to share as well.

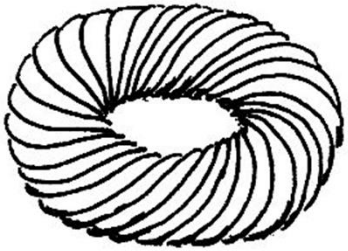
So, whether you're approaching the topic from an artistical or a mathematical point of view, I'd love to hear your experiences after spending some time making these cool objects.

August 21, 2024

Loose Ends

However smooth and neat we make our tourses, and however well we hide the loose ends, we know they're there.
At least two of them - a special case which you can achieve by making a Rolling Torus out of a single length of yarn.





A major advantage of this variation is that there is so little finishing off to do!

In similar fashion, I feel this booklet can now stand on its own as a rounded off unit while clearly a sequel to my "Nature of Twine Strings" booklets and a prequel to my future explorations.

After all, that reference to "interesting math" still resonates with me and calls for further investigations into the patterns involved in string twining. In particular, I want to explore how the numbers in my crochet patterns relate to torus knots and elliptic curves.

With the practical aspects of my modeling techniques now documented, I hope to have made this approach more accessible and I look forward to diving into the math once again.

Meanwhile, I'd love to hear about your creations and experiences with these crochet techniques, and I wish you all lots of fun making your own Rolling Toruses!

Have fun and enjoy.

Anneke

anneke [atsign] deonzichtbareschool.nl

September 1, 2024

List of Chapters

While writing, the order of the chapters kept changing in my binder; hence, in this final version you'll have to orient yourself by their order rather than by page numbers.

Bibliography

Meijer-Treep, Anneke, Nature of Twine Strings,
private publication, 2021
Meijer-Treep, Anneke, Nature of Twine Strings part 2,
private publication, 2023.

As said, the inspiration to research twine string and eventually crochet Rolling Toruses came to me after spending lots of time making cordage from natural fibers, especially linden bark.
My gratitude goes out to the plants and animals that provided these fibers, and to the craftspeople of many generations who passed down their skill and knowledge and had the wisdom of sharing the importance of keeping the art of string twining alive.

If you enjoyed this exploration or made some cool Rolling Toruses yourself, please consider contributing time or money to your local nature conservation project or wilderness school to support the continuation of this type of learning into the future generations.

Thank you!