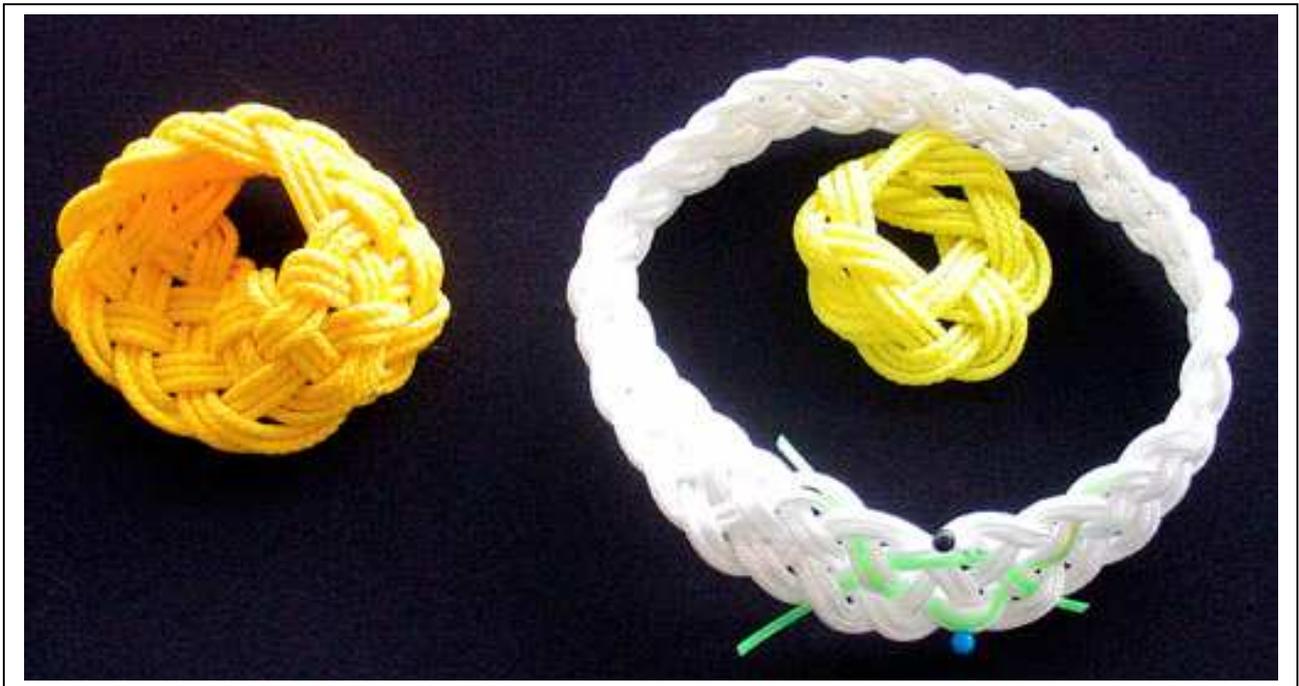


MAKING A MÖBIUS* STRIP** (MS)



Picture 1

* **MÖBIUS** minus the umlaut [¨] is **MOEBIUS**
** **not** a THK of any sort.

People should most certainly wonder about how you did one with cordage : a conversation piece with a twist of intelligence.

May be that will send some of them on an exploration trip to the peculiar world of this strip ?

Picture 1 : those are cordage Möbius Strips.

Now, please, let us manufacture a paper one :

Take a strip of paper, say 25 cm in length, 3 cm width.

Make as if to form a ring with it **but**, just before closing the two terminal edges together, impart to one of the 2 extremities a π radian (180°) rotation with respect to the other end. Clockwise or counter-clockwise, either way will do. It will only change the orientation 'Z' or 'S'. (I prefer to avoid the inappropriate use of « handedness » as it is here far away from the concept of « handedness ». Handedness is a neuro-behavioral preference - for a fuller explanation please refer to my web pages - levogyre/dextrogyre or left-chiral/right-chiral are more proper IMO)– Picture 8).
You just made a Möbius strip, band, ring, loop.

A very unusual creature it is :

only **one face** and only **one edge**.

<http://www.col-camus-soufflenheim.ac-strasbourg.fr/imagessite/Image-8732.gif>

It was, in fact, discovered by someone else than Möbius.

LISTING is credited with a 2 months head start over Möbius (1858).

To make one in cordage, as basic as the small pale yellow one in *Picture 1*, you can use the template I drew : *Figure 1*. (inspired by *Decorative knots p101* - Budworth)
4 LEAD is, in my opinion, the limit when using a drawn template.

The larger golden yellow MS in *Picture 1* I did directly around my hand : a 6 LEAD THK served as a guiding mould.

This is difficult as you only have you mind eyes to see what is not yet there, and a single strand (one colour) is no good visual aid.

You can also try the « cut THK » method , putting colour marks, sewing crossings, cutting, then threading in the final single strand in this Möbius 3D scrap template.
I was not really satisfied with that.



Picture 2

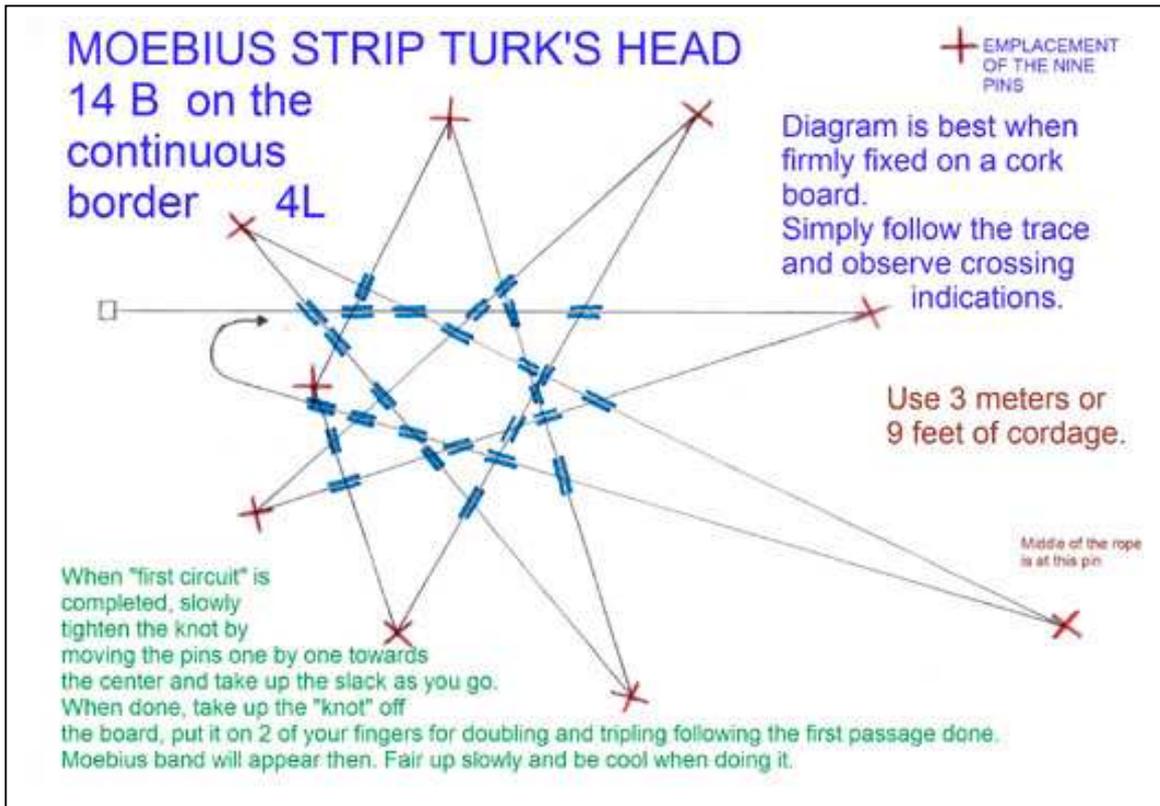


Figure 1

So I devised for myself another way to make the big white one in *Picture 1*.



Picture 3

Instead of using a 'very prone to mistake' THK mould (uncut or cut) I went the way of braiding differently coloured strands to have as visual disambiguating device.

GREEN (1),
BLUE (2),
WHITE (3),
YELLOW (4),
RED (5).

To work use the colours as indicators, but to understand use the digits. In either case, colour or digit, it is just a 'nominal' variable, nothing more than a label.

If this band of braid is simply closed on itself with each of the colour meeting with itself at the closure you get a structure that can lead to a 5 strands THK.

If each colour meet with another than itself (there are four ways : number of coloured strands minus 1) and if not any two colours leads one to the other then you get a mould to make a one strand THK by threading in a single final strand.

Picture 4



To get a Möbius the trick is to treat the braid strip (Picture 4) as if it were a strip of paper : apply a 180° rotation to one of the extremity before threading each of the 5 strands to the other side in the correct sequence.

The starting extremity of the braid will be denoted SPart and the other extremity will be WEnd.

One way (there are a number of them that I will let you discover and derive) the five colours meet after the 180° rotation is :

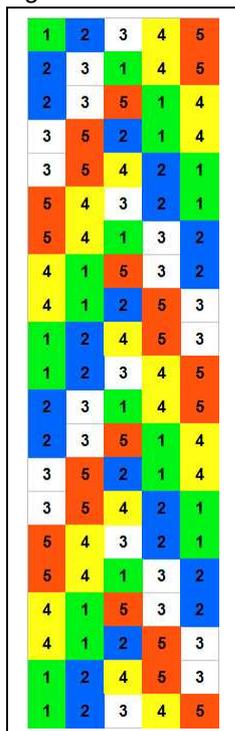
GREEN	(1)	meet	WHITE	(3)
BLUE	(2)	meet	RED	(5)
WHITE	(3)	meet	YELLOW	(4)
YELLOW	(4)	meet	BLUE	(2)
RED	(5)	meet	GREEN	(1)

Using digits that will give this closed path.

1 - 3 3 - 4 4 - 2 2 - 5 5 - 1

A single strand can run it. Just what we want.

Figure 2



Having used a THK as a mould for making a Möbius strip allowed me to see that transforming a THK into a Möbius strip is costing you the loss of some *BIGHT* and some change in the crossing.

Ex : with a 3 *LEAD* 20 *BIGHT* THK you will not get a 40 *Bight* Möbius but at most a 37 B.

When using the braid mould that fact is less evident.

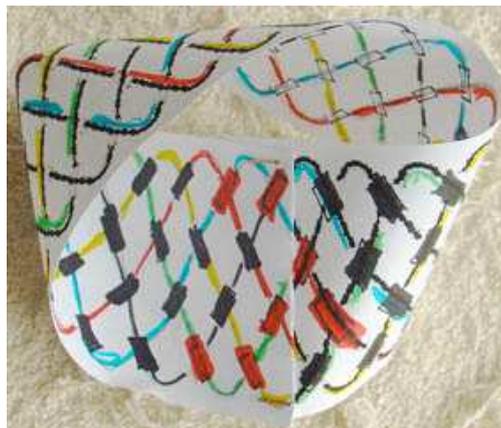
Note that the part where the closure is done has a special construction compared to the rest. (Pictures 5 to7)



Picture 5



Picture 6



Picture 7

1 2 3 4 5 WEnd

Without the 180° rotation being made before closing the braid you get a mould for a THK

-- For a 5 *STRAND* THK , the « closure » is = **1 2 3 4 5 SPart**

-- For a single *STRAND* THK mould you may use any one of those 4 closed circuits :

2 3 5 1 4 3 5 2 1 4 4 1 5 3 2 5 4 1 3 2
1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5

See Figure 2 to visualise. Print it and play with it

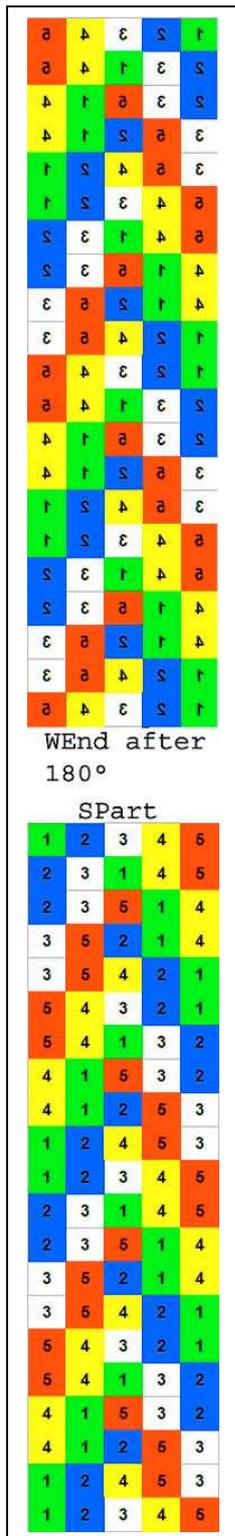
The closure sequence I used (after the 180°) for the large white Möbius was :

1 2 3 4 5 WEnd
3 5 4 2 1 SPart

I think that I have given more than enough to let you know how to do your own LISTING strip (I want to give back something to that mathematician).

There are many other closure sequences available for a closed path (I got 60 all told if you don't differentiate which is WEnd and which is SPart and 120 if you want to hold on the Spart/Wend difference)

Use Figure 3 if you want to work them out like I did.(computation & experimentation)



Just a few examples:

4 1 5 3 2 3 5 4 2 1
5 4 3 2 1 4 1 2 5 3

3 5 2 1 4 5 4 3 2 1
5 4 1 3 2 1 2 4 5 3

3 5 2 1 4 2 3 5 1 4
4 1 5 3 2 1 2 3 4 5

2 3 1 4 5 2 3 5 1 4
5 4 3 2 1 3 5 4 2 1

3 5 2 1 4 3 5 4 2 1
2 3 1 4 5 5 4 1 3 2

I made 3, 4, 5, 6, 9
LEAD MÖBIUS but who
will show a 17, a 19, a 23
LEAD or more in the next
KN issue ?

Glove is on the floor !

A word to the wise : the
length should be many
time over the width : just
play with paper to
experiment what I mean.

Don't use a too soft, or
too stiff, cordage.

Any ODD number of 180°
rotation will leads to
another sort of Möbius
but I will let that well
enough alone.
Try them if you dare !

EVEN numbers of 180°
rotation do not produce
Möbius, but 2 FACE & 2
EDGE structures.

Now, some links, to open
more vista.

Fig. 3

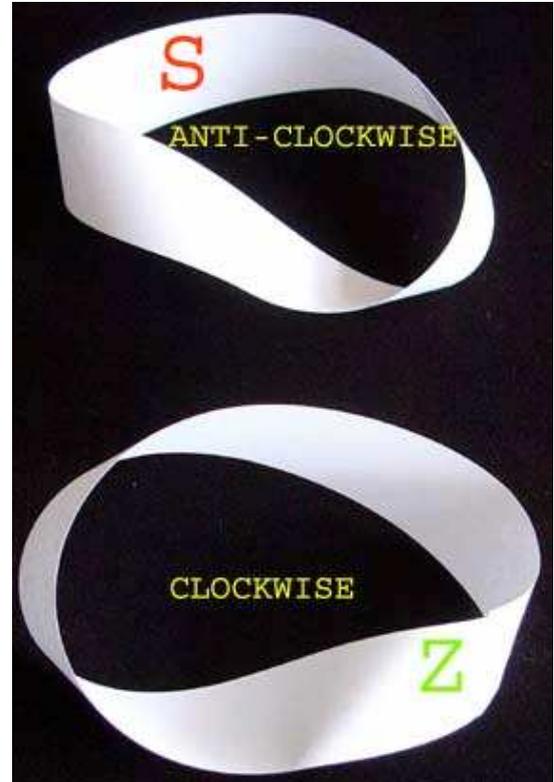
<http://web.meson.org/topology/mobius.php>
a seamless strip

<http://www.math.wayne.edu/~isaksen/Expository/vismath-paper/node4.html>

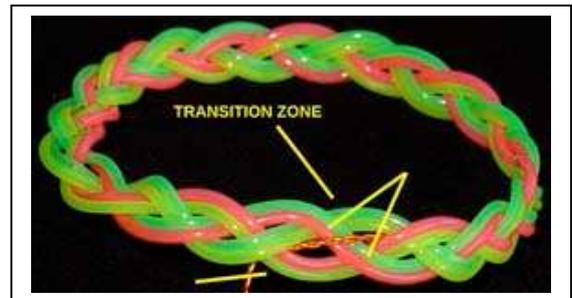
<http://www.math.wayne.edu/~isaksen/Expository/vismath-paper/node2.html>

a Möbius STITCH that should be honey to those making so called « survival belt »

<http://www.toroidalsnark.net/mathknit.html>



Picture 8



Picture 9

2008 May 30th
Vitry-sur-Seine – FRANCE
Charles Hamel aka Nautile ©
In loving homage to my late Father

