

# Knot News



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## Part II of A (very rough) Square-Knot Belt Tutorial

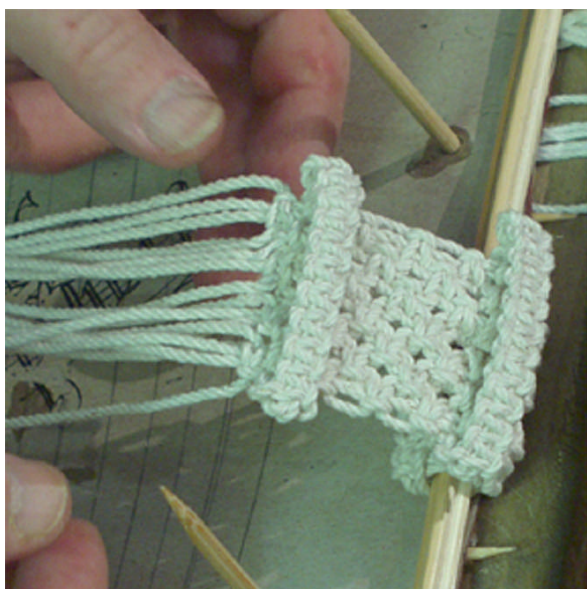
by Vince Brennan

The first portion of this tutorial was published in KN #52. Here is the next installment of instructions for those wishing to continue on with their belt and make it better.

### Making the Belt Loop

You're going to want to put a belt loop on the belt about five or six rows from where you cast onto the buckle... this retains the tongue if you're wearing pants with only a few loops on them and also is just a nice detail.

With a lot of practice you can actually create the loop from the fabric of the belt itself, but that's the "Master Class" project and here we'll deal with the easiest of the loops to put on.



Usually, ten or eleven knots in a row of whatever material you may be using for the belt will give ample clearance for a second thickness of belt to slip inside it easily. I prefer to have too large a loop as opposed to one which you have to fight with to get the tongue into it. In the #24 size line used in these belts, I like to start by using two and four toothpick spacers to create a space to go through and secure the loop to the belt. See the following:

*Incidentally, you're not going crazy: I am using a sample where a loop was already added to demonstrate this. This article took three days, five separate constructions and over 200 photos to finally get some useable pics... by the time I gave it "one more try", I wasn't about to start another one! If this hadn't worked there'd be no loop instructions.*



Starting the loop itself, allow about four inches of line and put an over hand knot in all four lines, then put one square knot about an inch from the

overhand knot and pull it snug but not real tight... you'll need to untie this one later on. Use a four-toothpick spacer and put it on as shown.



Bring both working lines outboard the spacer as shown and make one square knot behind it, bringing this knot up TIGHT to the back of the spacer. Move the spacer and do another one of these, then use a two-toothpick spacer and make one more square knot. These should all (except for the first) be nice and tight.

Now do a row of ten or eleven knots, one right on the other, all tight, then use the two-toothpick spacer, knot, the four-toothpick spacer twice and you'll have a "mirror image" of the other end. Again, the last knot should be snug but not tight.

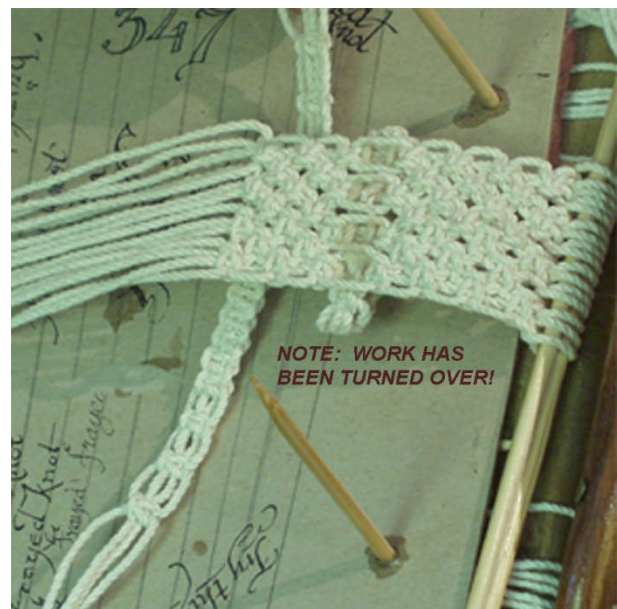


Check for width across the belt... you should have one knot extra (or two in really small material) projecting beyond the edge of the belt to give it an "arch" when it's completed.



Time for some fun. Turn the entire belt over so that you're now working on the BACK of the belt. You'll be taking the standing or filler pairs and passing them through the loops formed by the four-toothpick spacers. The loop formed by the two-toothpick spacer will act as a "hinge" to allow the loop to fold easily.

(Note the discoloration on the completed loop due to use of methacrylate. Since this is on the back of the belt, it's fairly immaterial to the appearance of the completed belt. As my Granny used to say, "I'll never be noticed from a galloping horse!")







This shows one filler pair as it comes through the top of the spacer loop. Cross the next two lines and then tuck it through so that it comes out just like it went in. Do this with all four sets of fillers in all four spacer loops.

TIP: Decapitate a toothpick and then cut a shallow notch in the (now flat) end, sort of a very shallow "VEE"... use this to 'poke' lines through tight spaces.



Once you've gotten all four sets of fillers threaded through the spacer loops, you'll make a square knot below each one to continue the belt fabric and lock in the belt loop.

REMEMBER that if you're doing the pattern I showed previously, to continue it you must now do your initial bights in the **OPPOSITE** directions so that when you turn the belt over the pattern continues. On the working side you'd pass the bight to the outboard, but here you'll pass the bights **INBOARD**.

Bring your knots up snug but do not over tighten... check to see you have a fairly straight line of knots when you've done all four. While this will be hidden by the tongue of the belt, a neat job is a neat job, after all. Nearly done now.



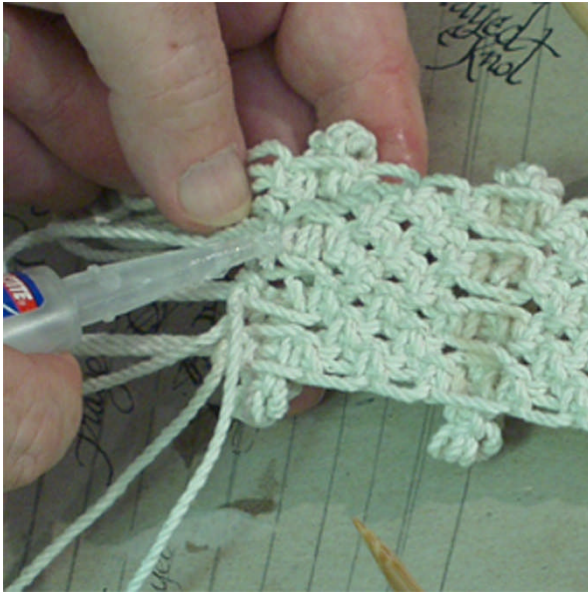
OK. Now that you've gotten the knots snugged up and you're ready to go on with the belt. You just have that great deal of line to deal with. Either untie the square knot in the loop end or just cut the line short as shown.

TIP: Before you trim off the excess, put a drop of glue on the back of the belt close to where you'll be cutting to hold the ends in place.

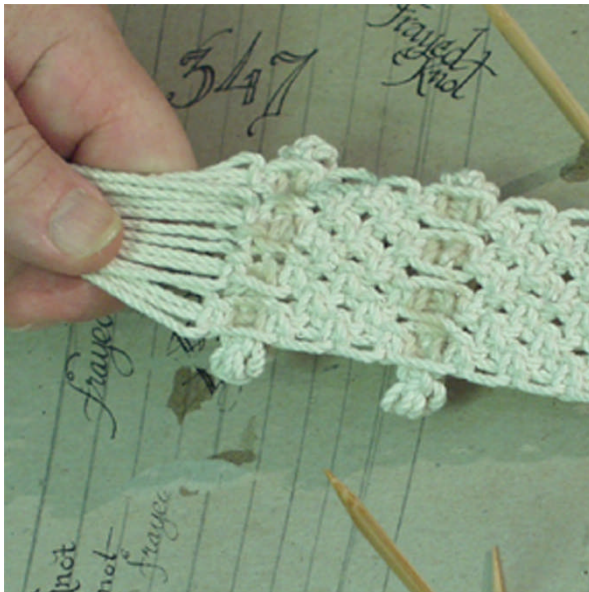
TRIM off these lines CAREFULLY, so as not to cut anything else.

The real goal here is to cut the lines so that they almost meet each other, just as though they were a continuous line. I get this about one-in-three but usually I have a gap... no disaster, that's why God

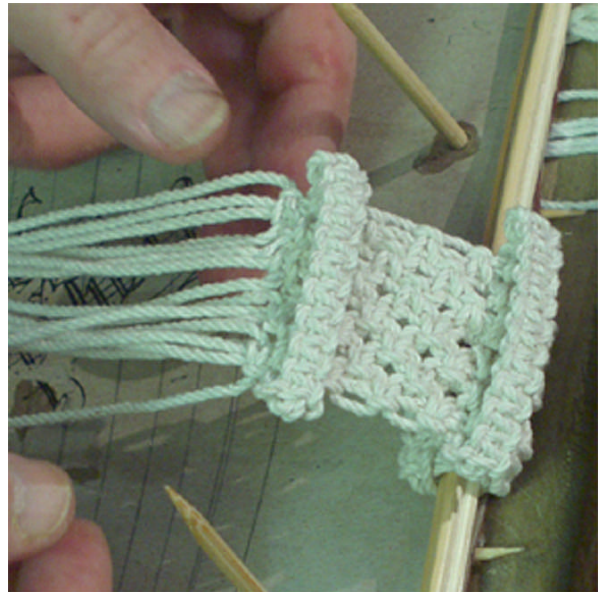
made methacrylate. Put your glue on the lines where they run across the belt and use just enough to secure these lines to the lines they cross... don't go "krazy" with the "Krazy Glue" and you'll probably not even see the glue discoloration on the "working" side of the belt.



If you wind up with sharp points from the glue, you can take an emery board (*DON'T steal your wife's or girlfriend's nail board... buy one for yourself unless you want to sing soprano!*) and smooth off the sharper points and rough surfaces. Works like a dream but don't overdo it.



All trimmed and glued and ready for flipping over so you can now put that amazing pattern into the belt and astound your friends and neighbors with your digital dexterity and nautical niceties.



(WORK HAS BEEN RETURNED TO THE CORRECT SIDE)

Belt loop all finished and ready to go. Continue with the belt. NOTE that you should use THIS point for working out the spacing on your belt pattern.

TOP SIDE

1

TOP SIDE

2

TOP SIDE

3

Materials: THREE toothpicks (appx 1/16" square by about 2-1/2 inches long) and six spacer sections cut from other toothpicks, about 1/2" to 3/4" long. Methacrylate ("Super") Glue, tweezers and perhaps a bit of dental floss.

To one toothpick, glue two spacers flat and one between at 90 degrees as shown in ((1)) and duplicate this about 1/2" to 3/4" below.

Glue a second toothpick to the flat spacers as shown in ((2))... note the profiles shewn by the squares

Glue a third toothpick to one side on TOP of the flat spacers as shown in ((3))... Allow all glue to cure hard (about 20 minutes) then trim off spacers flat to long toothpicks. (you can do a binding to hold the whole thing together while curing but that'd be for insurance only... allow the glue to cure and you'll be golden!)

To make the two-point spacer, stop after ((2)), allow to cure and trim as per the above.

Make several of these at a time as they always get broken, stepped on, dropped or disappear just when you need them.



## Knot Thought 002

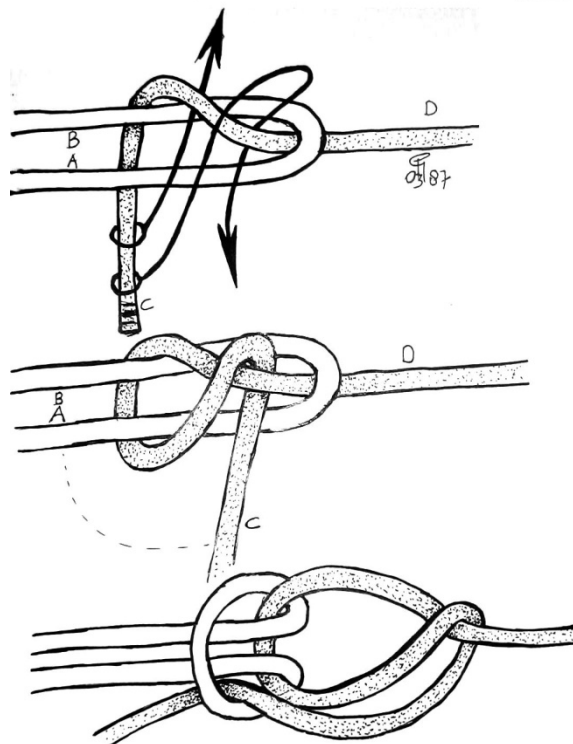
Pieter van de Griend

A Sheet Bend can be obtained by following the left-most trajectory in the top drawing: by taking the working end the other way around, following the right-most trajectory, a variant with some surprising qualities surfaces.

This knotted structure has a number of stable states it can be coaxed into. The most obvious one is given in the middle illustration. Note, that by connecting A and C, an excellent loop knot can be found.

Trying to understand from where it's merit-able characteristics spring, consider the lowest illustration. Composing parts turn out to be a Cow Hitch Section interlinking with a Backhanded Hitch Section respectively. Some of the best bends, such as the Full Carrick Bend, derive their good qualities from symmetrically adjoining two Backhanded Hitch structures.

I have not yet been able to find references in the knotting literature to this structure. Any suggestion as to where it might be found? Considering its simplicity, no doubt a source will turn up soon.



© Pieter van de Griend ©  
Stiphout August 2005.

## Untying a Math Mystery

by Margaret Wertheim

You have to hand it to mathematicians; they can turn anything into a formal problem. Balls packed into boxes, folded paper, even bits of string become, in the hands of mathematical theorists, gateways to worlds of Byzantine complexity and beauty.

Take a piece of string – I mean literally, got get a piece of string and tie it into a knot. Now tape the two ends together so it makes a closed loop – necessary to fulfill the mathematical definition of a “knot”. How many different knot types do you think there are? The number is infinite, and the question of how to categorize these manifestations of loopiness has engaged some of the finest minds for a century.

We are nowhere near to having a complete taxonomy of knots, and some mathematicians view the problem as so inherently difficult that they think it is an impossible goal. Indeed, “knot theory” is an area of mathematics in which almost any generalized question you can think of is unlikely to be answered.

Although knots in math are essentially one-dimensional objects, understanding them has turned out to be a significant challenge.

Moreover, knots provide mysterious links between the mathematical continents of topology, geometry and algebra, hinting that these enigmatic twists contain secrets to powerful, deep and general truths.

And yet this most esoteric branch of mathematics has also turned out to have immense application in the physical world. That's because we now know that DNA and many other long molecules arrange themselves into knotted structures. Knot theorists are suddenly in demand from biologists, who want help understanding how clumps of DNA move through different mediums, how proteins fold up and how polymers behave. The specific knottiness of a piece of DNA, for example, determines whether certain enzymes can act on it, which has important implications for understanding diseases such as cancer.

Ken Millett, a knot theorist at UC Santa Barbara, is a leader in the application of this mathematics to DNA and other molecules. In the 1980's, inspired by UC Berkely mathematician Vaughan Jones, Millett helped to revitalize knot theory when he was part of a team that discovered a strange new way of classifying knots. With this method, each

knot can be associated with a particular equation that uniquely characterizes it. Still, mathematicians have no idea what the equations actually signify; they don't seem to relate to any of the usual features of knots, such as shape and form. "Do they refer to some hidden structure within the knot?" Millett asks. "We really don't know."

Some physicists, however, think the equations are telling us something fundamental about the basic particles and forces of nature. They believe these arcane formulas may enable us to find the much-longed-for "theory of everything else" under the umbrella of string theory. The equations also turn out to have application to the emerging field of quantum computing, which many scientists hope will usher in an era of new, more powerful computational devices.

The story of knots suggests that we never know from what areas of mathematics useful applications may spring. Although mathematics has no physical substance, it can be as precious as gold or oil, and ultimately as integral to our economy. As President Bush noted in January's State of the Union speech, America's place at the top of the global pyramid depends on a workforce that is well educated in math and science. Yet, nationally, our schools are understaffed in these critical areas. Which brings me to the importance of Millett's other professional hat - math education. In addition to his knot research, Millett directs a program at Santa Barbara that recruits math and science undergraduates to become classroom teachers.

Given that a recent report by the National Academy of Sciences revealed that nearly 60% of American eighth-graders are taught math by teachers who did not major in math or pass any kind of certification exam, efforts such as Millett's are critical. On Feb. 25, his work was honored in Washington with an award from the organization Quality Education for Minorities.

In the State of the Union address, the president pledged to train 70,000 math and science teachers to handle AP courses. But the plan does not call for hiring any new teachers, which is woefully shortsighted. Math education does not require expensive equipment, specialized buildings or fancy facilities; it just needs good teachers and a supportive learning environment.

The lessons of knot theory suggest that investing in this "arcane" subject will, in the long run, pay dividends.

## 15 Bight Mat by Pat Ducey

In this edition of *Knot News* I have asked Joe Schmidbauer to enclose a template of a 15 Bight Mat, pictured below. Like the template for the 8 Bight Mat I sent out in the last edition of *Knot News*, this knot is not in *The Ashley Book of Knots*. This Mat is a little more complex, but using the same principles of a common divisor to close one end of a square Turk's Head. Typical of my Grandfather's work, in the center of the knot the pattern changes to over-two, under-two to take care of the lumpiness in the middle when it is over-one, under-one.

To use this template you may have to trim one edge to make the overlap on a toilet paper tube a perfect match. Fill the toilet paper tube with newspaper to keep the nails secure. I like to cover the nail holes with clear tape so the paper doesn't get damaged with nails going in or out. I usually pull out about 18 feet of string, and start where there is a color change in the template. Unlike Ashley, where there is a definite start point, and circles to indicate where you have to go under, I employ a guide showing all over/under crossings. It is up to you, the knot tyer, to remember what color you are on, and what color you have already tied. Good luck!

If you have questions with this knot, or any kind of Turk's Head problems, go to the forum at [www.igkt.net](http://www.igkt.net) and post questions there and I will get back to you. If you don't have Internet access, post questions to the editor of this newsletter, and I will answer them here.





**The Rigging Club  
with Jose Hernandez-Juviel**  
by Jimmy Ray Williams

The *Exy Johnson* and *Irving Johnson* are twin brigantines built by the Los Angeles Maritime Institute for use in their Top Sail Youth Program. As they are approximately 5 years old, there is, obviously, need for maintenance on the rig of these ships. As a means to that end, the Rigging Club was started in early 2005. Jose Hernandez-Juviel is our fearless leader. His inspiration comes from Captain Steve Peckham, Captain Doug Corey and, of course, Captain Jim Gladson. Captain Gladson is the President and Founder of the L.A. Maritime Institute and the Top Sail Youth Program. (Jose actually considers any/all of our suggestions and encourages us to be on the lookout for any needed maintenance any time we are on the ships.)

Jose is teaching us about the rig and how to perform maintenance on it. And the unfortunate events in March 2005 created an immediate need for repairs on the *Irving*.

In the meeting held on January 23, 2006, Jose showed us how to Worm Parcel & Serve a line. One of the Flemish Horses for the *Irving* was our training material. It was made in 1/2" Roblon, approximately nine feet long, with about eight feet requiring worming, parceling and serving. For the worming, #48 tarred seine twine is used, and for the service we used #72 tarred seine twine.

[The captions provide the information on the steps taken. Note in picture #7, you can tell the parceling has been coated with pine tar.]







We all get to "seat" the worming w/mallet & gasket.



Parceling in progress with two inch friction tape.



Starting the "service". First 5 or so wraps are tightned with a marlinspike hitch.



Continuing the "service" with a Serving Mallet".



Again, everybody gets to "service the line".

A sorceress, failing for a moment to look up, squats in his path: "Want to capture a girlie's heart, my dear? Want an enemy under your thumb? Try me out: try my little knots!" And raises, dangles a knotty rope, ensnarer of human lives - but, seeing now to whom she speaks, lets fall her disappointed arm and slinks away, mumbling, into sand.

*The Satanic Verses*  
Salman Rushdie