

Project: Silk Road

By John Huddleson

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I have enjoyed riding bicycles for many years; not as a racer or club rider, or even on long distance tours, but just for fun and good health. When I reached my late fifties, bike riding was beginning to get a bit painful even with a 7 mile round-trip commute 4 or 5 days a week, interspersed with longer week-end rides. Attempts at 30 to 50-mile Saturday trips on a single bike or on a tandem with my wife, Shirley, inevitably lead to soreness and an incredible numbness in areas both mentionable and unmentionable. Even my good friend, Spenco, let me down. Although I was getting very uncomfortable riding a bicycle, I didn't want to quit; Shirley and I both enjoy good food and we gain weight if we don't get enough exercise. Also, the stress from running our own business is overpowering without some kind of regular exercise. Besides, bike riding is a fun, environmentally sound way to travel. But how could I eliminate the painful side effects?

I started to look for answers on the Internet. My exploration led to many articles describing the benefits of recumbent bicycles as a way to pain-free riding. In a search for more in-depth discussion, I followed this initial exploration with a subscription to RCN, along with a few back-issues related to my interests. With these resources in hand I began to get a good feel for some of the alternatives available to the standard "wedgie" bike. I thought the best choice would be a recumbent tandem since Shirley and I enjoy riding together, even though we ride at different speeds. Our experience with a diamond frame tandem was positive, in spite of our first tandem being an inexpensive, heavy, department store bargain bike.

My good friend, Peter Wagner, has been building very unique bikes for many years, since he was in high school. His "Whymcycle" bicycles have been a real source of fun and entertainment for people in the Davis community and he loves to share his knowledge. After Pete and I had several discussions and we reviewed some of the plans and pictures I downloaded from the Internet, he convinced me that with his help I could build my own recumbent tandem. He was right!

The 10-step process for building "Silk Road" went as follows:

1. Download from the Internet every picture and article about recumbents and bike construction I can find; review back-issues of RCN for construction ideas.

2. E-mail questions to anyone who has a web page with a bicycle similar to what I want (sizes, dimensions, materials, components and sources).

3. Phone people whose web pages show bikes that are close to what I want to build. Telephone discussions are particularly helpful for final decisions on tubing gauge and diameter, wheel sizes and fork angle.

4. Sketch (and re-sketch) what I want until I develop a "final" plan, complete with dimensions. Inseam and X-seam measurements for both the captain and the stoker are critical for establishing final bike dimensions, especially if you are trying to keep bike length to a "reasonable" level, a difficult thing to do with a recumbent tandem! Once you determine the wheelbase (89" on my bike, it would need to be longer for someone taller than my 5'9" and Shirley's 5'6") everything else begins to come together. However, some of the dimensions don't fall in place until later, during steps 8 and 9.

5. Search for parts. My friend Pete is particularly helpful with this; his garage is a real "treasure trove" of retro stuff.

6. Get parts that can't be scavenged or that should be new for safety and dependability. This includes 4130 CroMo tubing (from Aircraft Spruce) and the tandem crankset, handlebars, stem, BMX bottom bracket adapter, cables, chains (lots of chains), wheels and tires from local bike shops. Tim, from B&L Bike Shop in Davis, is particularly helpful with wheel construction.

7. Build wooden jigs and cut shims for the seat frames and main frame. Cut tubing to size, bend, file, fit, file again, re-fit and attach the tubing to the jigs.

8. Assemble the main frame on the 2-foot by 8-foot, 3/4-inch thick particleboard "template", which holds everything in place for brazing.

Be sure there will be sufficient clearance between the pedals and the ground and between the captain's feet and the front wheel.

9. Arrange for the frame to be brazed. I used the services of Davis resident, Kimo Tanaka, whose "Innerlite" custom-built frames are well respected. Locate the seat positions and stoker's bottom bracket after the rest of the frame is brazed.

10. Do final fitting and brazing, assemble components to the frame, ride the new bike!

After the construction process was completed, Shirley and I rode the "Rusty Duckling" for about a month to make sure that everything worked and that no modifications were necessary. Then I took the bike apart and had the seat frames, fork and main frame powder-coated a deep metallic blue. Powder-coating represented one-fourth of the total cost for Silk Road, but it was worth it; when I re-assembled the bike, a "Swan" was born; it looked great! A set of custom silver colored adhesive labels made by a local sign and trophy shop provided a nice finishing touch at surprisingly little cost.

"Silk Road", the final result, is an attractive, long wheelbase bike that eliminates my previous problems with numbness and pain and cost me less than one-fourth the price of a commercially built recumbent tandem, including the powder-coat and custom brazing. Even though it's home built, Silk Road has the look and feel of a pretty well thought-out, commercially built bike. Comfort? You bet; the bike is stable at low and high speeds and is so comfortable that I keep looking around for the television remote. Shirley often rides hands free and can easily "fix lunch", adjust the stereo, provide turn signals and wave at the "gawkers" as we travel. The bike is not a strong climber, but I think that's largely a function of the "engines".

In exchange for this relatively inexpensive and nice looking, easy to ride and very comfortable bike, I contributed a lot of time and got a few blisters in the process. Hacksaws and "bastard" files became my new best friends (did you ever wonder why they call them that?). Also, my assembly of components is not state-of-the-art; most of the parts are recycled retro, although of good quality. Even the Araya drum brake came from a used tandem.

The seats, made with half-inch electrical conduit (recycled from Davis Waste Removal), are firmly attached but can slide to adjust for leg length and can be easily removed to transport the bike on a standard Yakima tandem roof rack. They are attached to the bike frame with stainless steel hose clamps; a section of angle iron welded between the two cross braces on the seat bottom nests with a section brazed to the bike frame top tube, to maintain alignment. One of the cross-braces on the seat back also has a custom built bracket to hold the seat firmly to the seat post. The seat angle can't be adjusted. The bike has just enough room for the captain's seat back to avoid the stoker's knees; any more recline would require a longer wheelbase. Also, I discovered why Ryan (now Long Bikes) puts a "horn" at the front of their seat and the Peugeot "Quetzal" originally came with a seat belt. Without something to hold you back, you have a tendency to slowly slip forward on the seat (depending on the "friction coefficient" of your shorts, lycra being "0") and you need to slide back every few miles. The seat bottom is about 12 inches long; it could have been a couple of inches shorter without any problem, but should probably be angled up slightly in front to help prevent slipping forward. The angle between the seat back and seat is about 120 degrees, a comfortable compromise. Shirley used a medium weight denim fabric for the seat covers, laced to the seat frame with 50 feet of bungee cord, through grommet reinforced holes. A shoestring was sewn inside the edge binding, "outboard" from the grommet holes, to avoid pulling out the grommets under tension.

I finished the bike in mid-May of 1998 and by the middle of December 1999, Shirley and I had put just over 5,200 miles on it. We have started on our third front tire; any suggestions for something better than a Primo Comet 1-3/8 on the 451 rim would be appreciated. Also, I replaced the original recycled headset with a new one after about 3,000 miles ("indexed" steering was a bummer). Nothing else has been re-

placed, but the synchronizing chain between the captain and the stoker is starting to show signs of stretch and will need replacement soon. The seat material is also beginning to wear; it probably will last about another year and then we will replace it with a heavier canvas or possibly with a more open mesh, if we can work out the sewing.

The intermediate, low/high range gearing has turned out to be a very good feature; many problems you might anticipate with chain length, tension and alignment, as well as with shifting and adjustment, are greatly reduced by using this setup. Also, every combination of rear cluster gear and chainwheel is easily available with this kind of gear train, since tension and alignment for the chainwheel and for the rear cluster are controlled by two separate rear derailleurs on two separate chains. I highly recommend this method, even though it may cause a slight increase in drive chain friction; a real gear-freak could add another chainwheel to the intermediate cluster, giving over 60 choices! Besides, what else are you going to do with that extra bottom bracket hole? I did find a good use for those CD's that AOL keeps sending; they make a good revolving reflector on the unused side of the intermediate cluster axle.

The bike is holding up extremely well; actually, because of the increased exercise, so are we! In the first 6 months of riding Silk Road, Shirley's blood pressure declined 30 points and we both lost just over 20 pounds; maybe I should have named the bike "Health Rider"! If you would like to see some color photos of Silk Road, check out my web page at:

<http://www.tender-learning-care.com/mybike.htm>.

◆ **Specifications:**

- Wheelbase - 89 inches
- Total length - 112 inches
- Weight - 59 pounds, ready to roll!
- Cost - approximately \$14/pound
- Front end - Recycled BMX bike
- Head tube angle - 68 degrees
- Fork Alignment
 - Rake - 1 1/8 inches
 - Trail - 3 1/2 inches
- Rear triangle - Recycled mountain bike
- Main Tubing - 4130 CroMo
 - (top tube, 1-1/2" x .035; bottom, 1-3/4" x .049)
- Finish - Sandblasted and powder coated, metallic blue
- Wheels:
 - Front - 20 in. (451 mm), 32 hole
 - Rear - 26 in., 48 hole
- Shifting - Mostly recycled Shimano retro-friction
- Gearing - 42 speed (3x7x2)
- Gear inch range - 15 to 117 inch wheel range
- Brakes - Front & rear cantilever plus rear drum
- Captain controls - Front & rear cantilevers, front derailleur, rear derailleur
- Stoker controls - Rear drum brake, intermediate (low/high range) shifter and Stereo!

