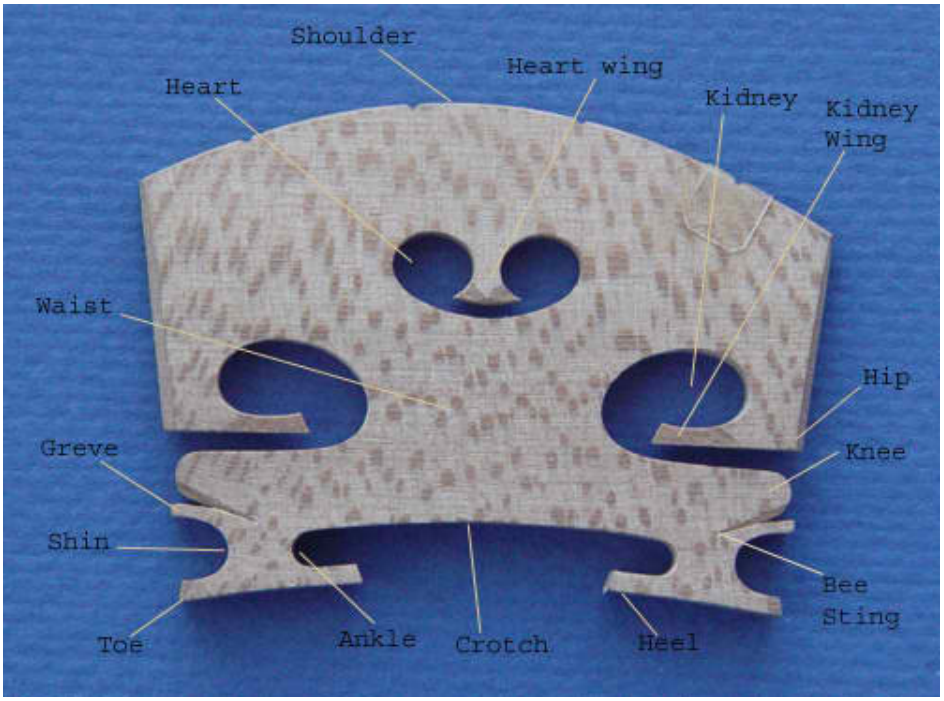
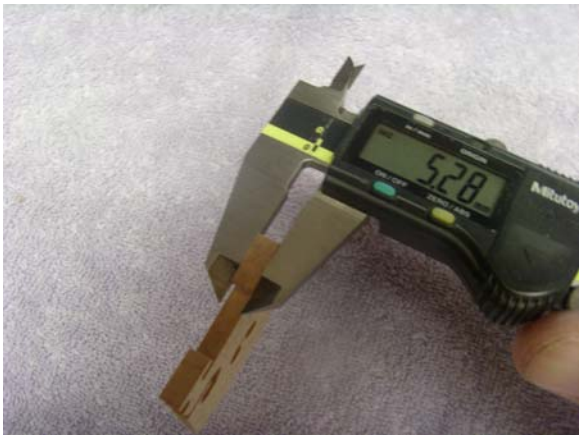
OK, I'm going to show you how I make a new replacement bridge for my violin even though my current one is fine. This will be a backup in case something goes wrong.

#1: Find a supplier of a good grainy maple bridge. Most of the best are from Europe but some of the Chinese maple ones show promise. You just have to be careful and look for some with a good grain definition and closely spaced rings.

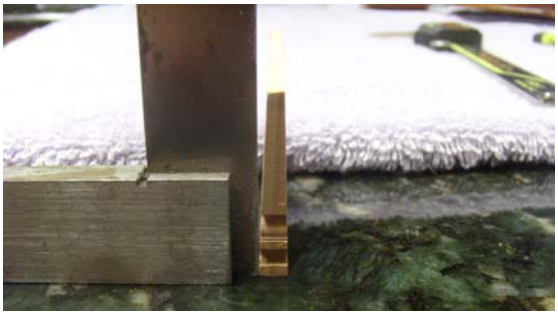
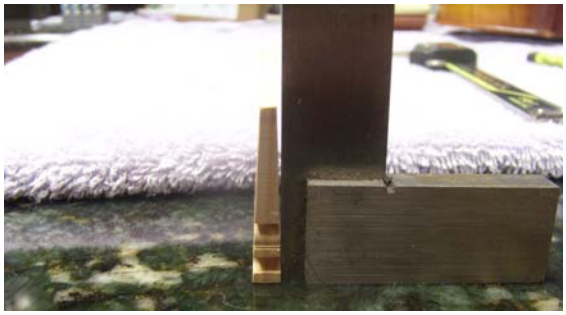
#2: Evaluate what you have. Look at how thick it is at the feet. Don't know what the feet are; look at this drawing below to see what all the parts are called. This bridge has a nice grain structure, even and dense… it'll be expensive, maybe as high as $12.00 USD.



3rd: Now that you've looked at the feet, decide if they are the same thickness or not. Some are cut on an angle and some really nice and square. This one was a little off but very close. The difference was only .03mm or .001". It's probably actually 'dead on'.



4th: You need to determine which side is the “square” side, if your bridge has one. Do this by standing a square up against the bridge on both sides and see which one is closest to touching the whole way up. I used my granite countertop because it’s really flat and smooth. If it has a mfg ink mark on it, that’s the square side.

It would appear from these two pictures that the right side is the square side and the other is tapered more. Place a small pencil mark (X) on the square side if you don’t have an mfg ink stamp on it already. This will insure you keep one side proper and only cut and sand on the tapered side.

5th: I already had a uniformly thinned bridge which was sanded down evenly from the feet to the shoulder. It measured 3.87mm at the feet and tapered to 1.5mm at the top (shoulder) where the strings cross it. I wanted to try a different shape just to see if it made a difference.
Here’s what I wanted to do. I wanted the feet to be as thick as I could keep them (more contact area with the violin body surface) and do a gentle undercut right above the ankle area to reduce the mass. Hold the bridge in your hand like shown below and sand only on the upper portion using your hand as a “stop” or fence.



6th: Determine the height of your existing bridge. This will be the controlling factor in your distance the strings are from the fingerboard. Make sure you do not go below that number. The strings can hit the fingerboard and buzz if you do and you'll throw away all your hard work, a few bucks in cash and have to start over.

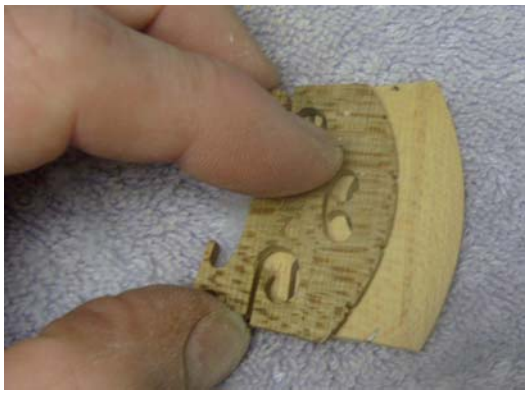
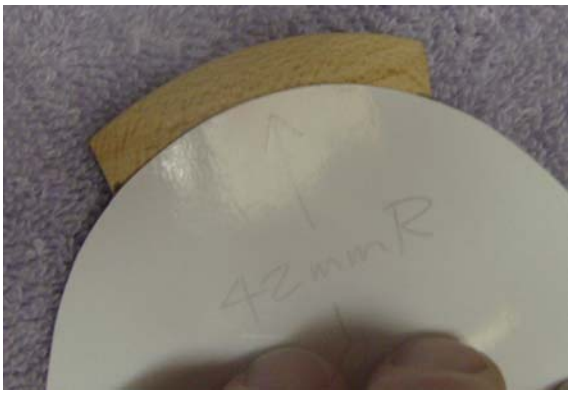
7th: Now it's time to remove your existing bridge. Relax, it's easy. Step one- Back off the string tension… a lot. Don't turn the pegs the wrong way, loosen them. After getting all the tension off, be extra careful and use a big soft fluffy towel to lay your violin on, you wouldn't want the sound post to fall over! Nor do you want it scratched up.
Step Two- Remove the rear peg that holds the tailpiece on. Twist and pull firmly. Lay all the strings and tail piece off to one side, don't worry about the pegs and the strings now, that'll come later on when you're all done here.

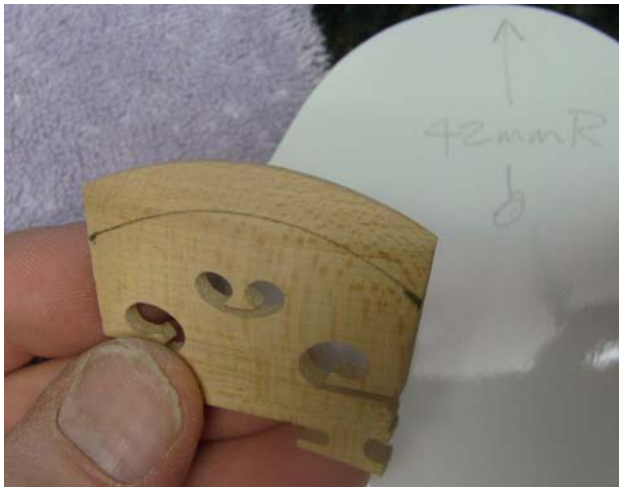

8th: After you have removed your existing bridge you can lay them side by side and see how much the shape will change on the new one. Don't be scared, it'll all work out.

9th: Time to make the guide marks for cutting the top. Lay out a sheet of paper and make a 42mm radius arc on it. That's a 84mm diameter. I used my calipers because the paper is photo glossy paper and it leaves a nice mark to follow with the scissors.



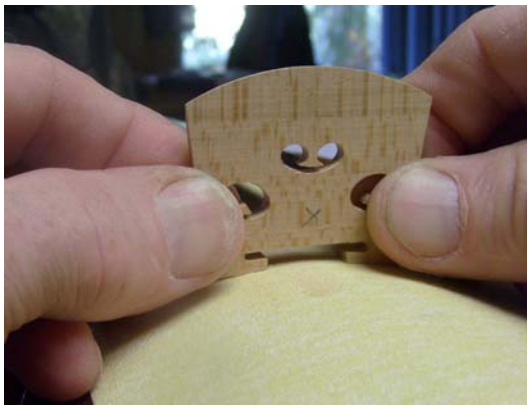
10th: Now lay out the marks using your existing bridge. Make a small pencil tick mark at each side. Don't worry about the middle, we'll take care of that shortly. Use the template you just cut out (The 42mm arc) and make sure it just touches the marks you drew on the wood edges. Follow the curve with your pencil and make your guideline.



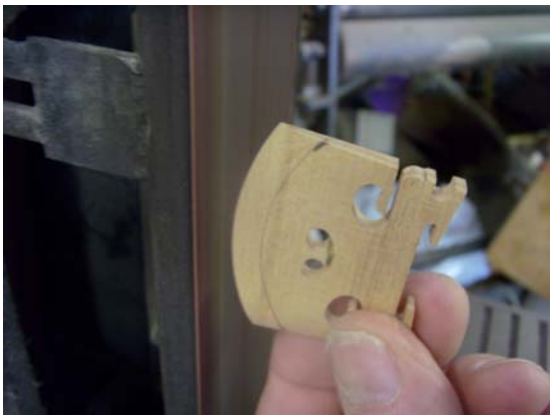
11th: This is where the fun comes in… take a piece of sandpaper (120 grit to 220 grit), carefully lay it on top of the violin body. I used a DA sander type circle of paper that has the peel away plastic cover on the sticky side, leave it on. It just helps to protect the finish. Place the bridge on the paper with the (X) side facing you, (X) towards the tailpiece end of the instrument.


Now, take both hands and grip the bridge firmly and slide it back and forth applying downward pressure to match the feet to the curve of the body. Keep it perfectly straight up and down or the feet will be rolled and worthless. Hold the paper with some fingers, flex the others and move the bridge one way while cutting. Lift and return, cut again.




After a LOT of careful sanding the feet will match the curve of the violin and it will stand by itself nice and be square on there. This is the ultimate achievement. You know you can do it if you get this far and have it stand there like this. Both of mine will stand there alone. They fit perfectly. So far I've spent about 15-20 minutes to get that new one to this stage.


12th: Time to shave off that excess wood. Careful now, I used a belt sander and held it very firmly and squarely so the top would be perfectly flat. Take it down to just touching the line. No MORE! Make it a nice smooth arc, following the line. Finish it with the sanding block by hand.

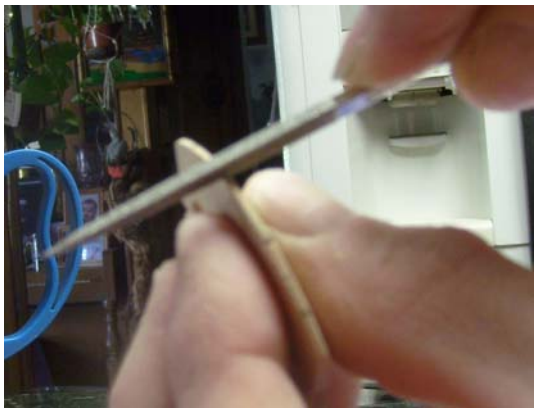
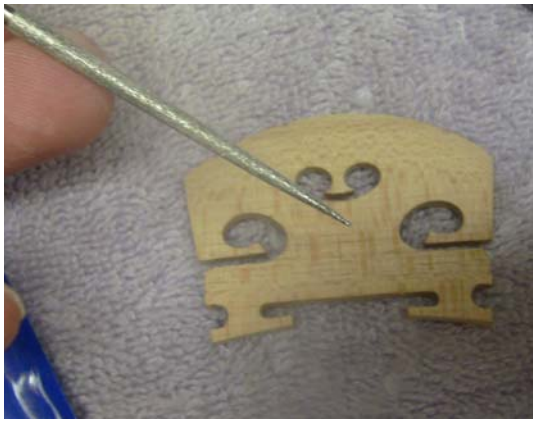


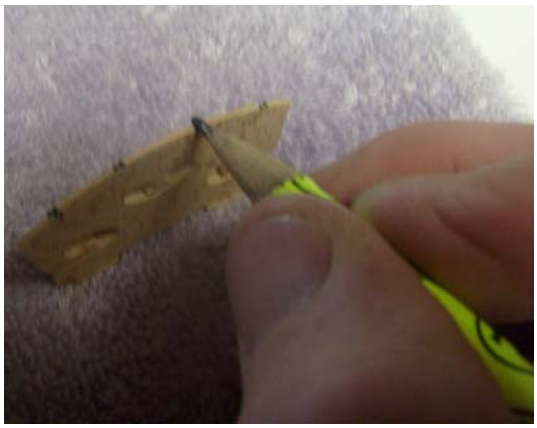

13th: Now, find that sandpaper block and start thinning. Use a smooth even stroke and remove the wood equally all over the surface. Don't sand on the (X) side at all, except maybe a smoothing pass to remove the edge that was created from the belt sander. I thinned my shoulder area to less than 1.5mm wide for the strings to sit on.



Now match the string grooves with a mark.

14th: Time to cut the grooves for the strings. They are usually laid out at 34.5mm width overall and 11.1mm between strings in case you don't have a bridge to use as a guide. Take a small triangle shaped jewelers file (mine are a cheap Chinese diamond set I bought at Harbor Freight Tools for $10.00) and make a small indentation exactly on the pencil mark. Not too deep, just enough to catch your fingernail in. Then take the smallest round tapered file you have in the set and roll it between your fingers to make a perfect rounded groove for the string to be cradled in. Add a little graphite to the grooves.

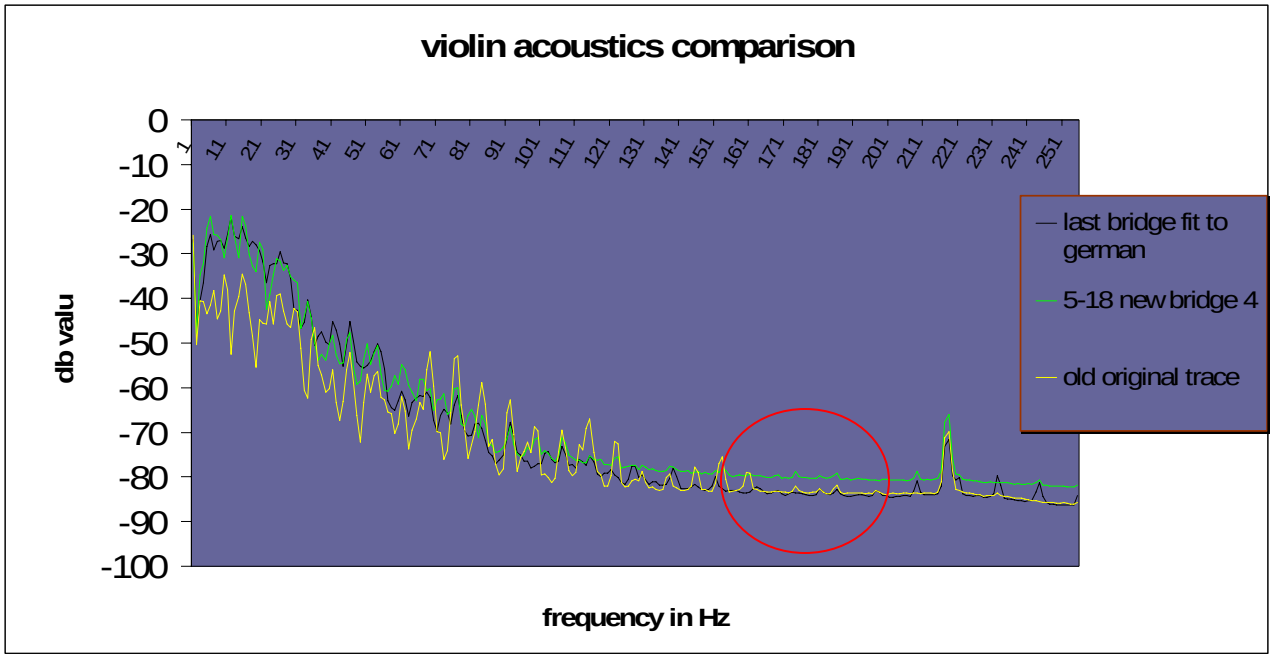


15th: Time to go back together. Place the tailpiece securing loop onto the peg and push firmly into the hole. Don't overdo it. Pinch the loop between your fingers to get some of the 'roundness' out of it and make tightening the strings easier and quicker. The bridge is just lying on the violin for now. Loosen the strings a bit more and gently raise the bridge up under them. Pay attention to the E string sleeve, make sure it's in the groove, and make sure the strings are in their proper order at the nut end as well, now's the time to make sure the pegs are properly wound still and nothing is amiss in that area.

16th: Time to tighten up the strings. Carefully and slowly, it'll take a while to get them up to snuff. Go slow and bow the strings to tighten the tailpiece loop and settle everything. The strings need to settle into the grooves of the new bridge and the strings themselves need to get back up to tight. I wanted a little taller bridge so my old one will easily fit just under the new one. Perfect job! Now to test to see if it's in the right place.

17th: I use sound spectrum analysis software and plot the sound generated by the violin. I also compare it to the previous attempt at making it sound the best and if things get better I continue, if they don't I try something different. There's a LOT of trial and error in this stuff. The numbers do not lie and even though you think it might sound great, there could be some room for more improvement, let the analysis software be your guide.

On the analysis charts the traces are all over the place. A trace that has minimal high and low sweeps is preferred. Wildly bouncing up and down as it goes from one end to the other is very undesirable. A smooth trace and a highly positioned trace will indicate a very expensive or well crafter violin. I have done a Strad, a few $20,000+ German violins and some $100 Chinese ones as well, and in every case, I can tell you which is which by only looking at the trace and the info it can portray.



You can see from the Yellow Line (The original sound) that I have improved the sound of it considerably. The new trace (Green Line) is smoother and actually has a louder indication. The base frequencies have been enhanced over 20db in some instances. The higher frequencies are not so much enhanced; they are very difficult to get much past -70db in the 17,000Hz+ range. Although I have changed bridges, the basic harmonic property of the violin has remained unchanged and you can see the mirror image 'bumps' and spikes in the trace that would indicate this was the same instrument used in the tests. The old bridge that was on the violin is the dark blue trace and it was a big improvement from the original as well, but my latest attempt with the gentle curved shape and larger foot contact pattern design shows even more projection and a smoother trace. I think this was well worth the effort. What I do next will be anyone's guess. Maybe try a carbon fiber bridge…

Written by and testing done by: Dennis
Dated: May 18, 2012