

How to Assemble the 3D-Printed Acoustic Violin

By Brian Chan

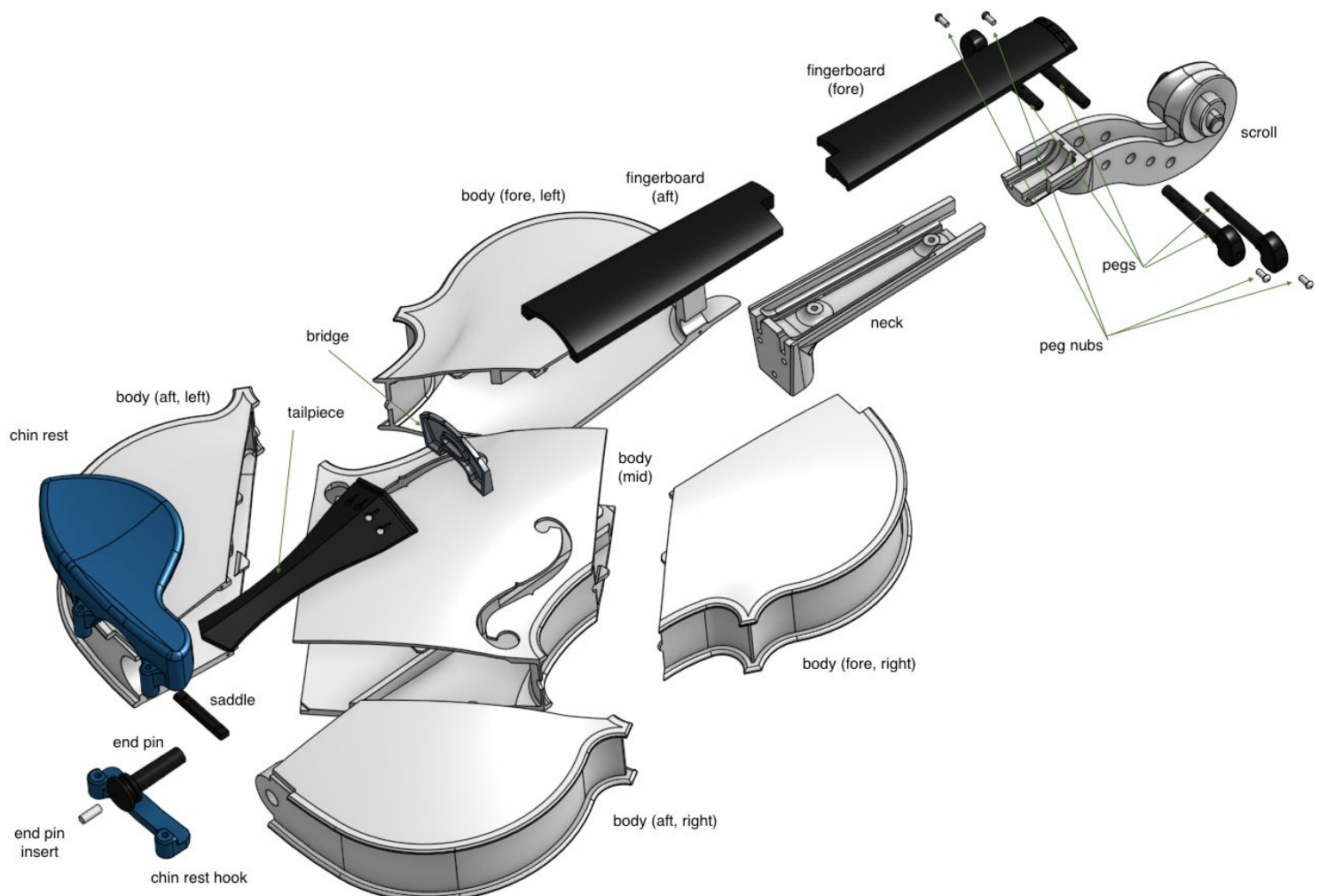
The violin has always been a favorite instrument of mine. When I got my 3D printer, I wanted to see if I could replicate its sound with a 3D printed version.

I have been making musical instruments for years, but this is the first instrument of mine that is (aside from hardware) completely 3D printed! The following instructions will help you to assemble the violin. Before starting, please read through the whole thing so you can be prepared.

I hope you enjoy building this as much as I did!

You Will Need:

A Set of 3D printed parts for one Violin:



body mid	body fore L	fingerboard fore	body fore R
neck	fingerboard aft	body aft L	scroll
body aft R	saddle		

The following parts can be skipped if you choose to buy the traditional counterpart(s)

peg (4x)	peg nub (4x)	tailpiece	bridge
chin rest hook	chin rest	end pin	end pin insert

You will also need the following tools and materials. I have included links to the places where I bought them.

From [Home Depot](#):

[Clothespins \(8x\)](#)

[Flush cutters](#)

[Flat file](#)

[Set of Needle files](#)

[Hacksaw with fine-tooth blade](#)

From [McMaster-Carr](#):

[Low-viscosity superglue](#)

[180 grit wet-or-dry sandpaper](#)

[400 grit wet-or-dry sandpaper](#)

[Steel dowel pin, 1/8" diameter x 1" long](#)

[Brass rod, 1/16" diameter](#)

[M3 nuts](#)

[2.5mm allen/hex key](#)

[M3 x 10 socket-head cap screws \(5x\)](#)

Skip the following three items if you plan to buy a chinrest:

[M3 x 16 socket-head cap screws \(2x\)](#)

[M3 x 22 socket-head cap screws \(2x\)](#)

[M3 x 20 female - female standoff nuts \(2x\)](#)

From [Stewart-MacDonald](#)

[Set of violin strings](#)

[Violin fine tuner](#)

[Carbon fiber bar, 1/8" x 3/8" x 24" \(3x\)](#)

[Rosin](#)

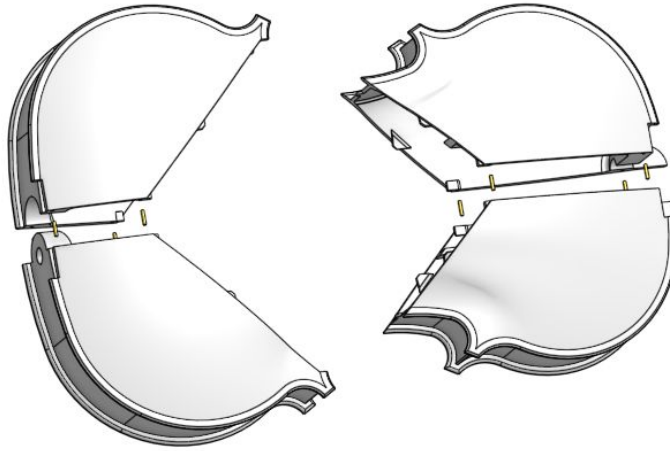
[Violin Bow](#)

[Tailpiece Fastener](#)

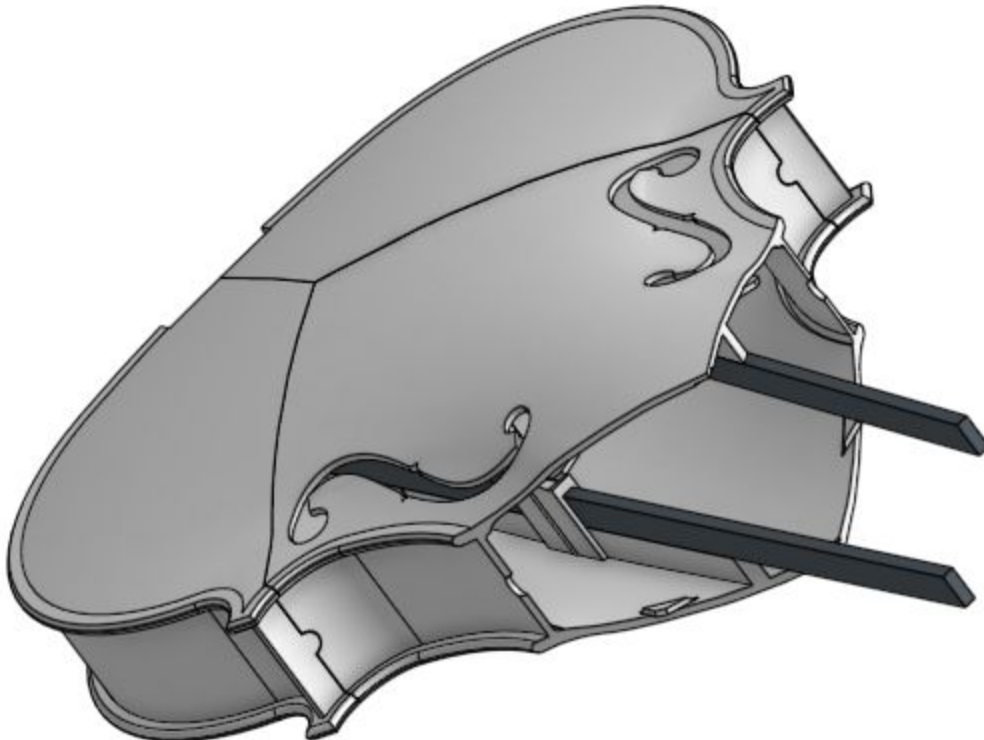
Step-by-Step Instructions:

Remember to be safe! Always wear eye protection when using machinery, using flush cutters, or working with superglue (which can sputter or splash into your eye).

- 1) Cut off the following lengths of brass rod, and use a flat file to round the cut edges. :
 - a) Eight 8mm pieces
 - b) Eight 48mm pieces (skip if you plan to use traditional violin pegs)
 - c) One 46mm piece
- 2) Prepare to cut the carbon fiber bars to length. Generously wet the hacksaw blade with water while cutting, so that all of the carbon fiber dust is captured in the water. You don't want to inhale any of it. Cut off the following lengths of carbon fiber bar,
 - a) Two 330mm pieces
 - b) Two 200mm pieces
 - c) Two 138mm pieces
- 3) Use the wet/dry sandpaper to chamfer the cut edges so they are no longer sharp. Wet the rod and sandpaper while sanding, After you are done, wash off all the tools and use a wet paper towel to wipe down the workspace to remove the carbon fiber dust.
- 4) Press three M3 Nuts into the hexagonal holes on the inside of Body Fore L and Body Fore R. Make sure they are pressed all the way in. Carefully (using a toothpick or wire) apply a small amount of glue to prevent them from slipping. Don't get any glue in the nut threads!
- 5) Insert four 8mm brass pins into the holes in Body Fore L, and assemble Body Fore R (the two should fit as halves). Adjust the parts with files until the parts close together without a gap, then apply superglue to attach the halves. Do the same for Body Aft L and Body Aft R.

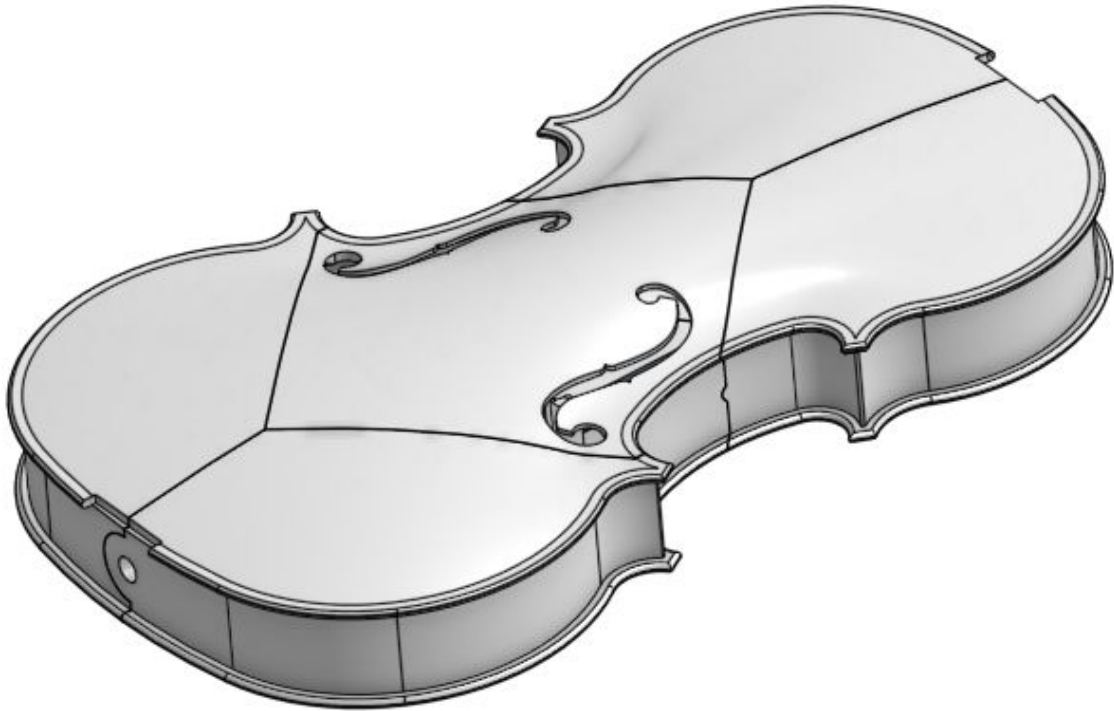


- 6) Test fit Body Mid to the assembly of Body Aft L and Body Aft R. Ensure that the parts come close without a gap, and that the tabs are fit inside properly. Apply superglue to the seam to attach Body Mid to the Body Aft halves.
- 7) Insert the two 330mm carbon fiber bars into the Body Aft + Mid Assembly but do not apply glue.

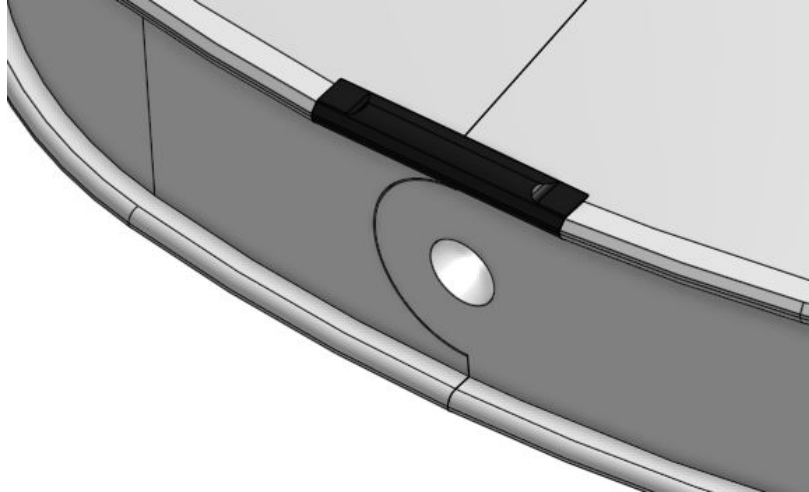


- 8) Slide the Body Fore Assembly onto the free ends of the bars and adjust the gap with files if the Fore and Aft + Mid Assemblies do not come together all the way. If you are

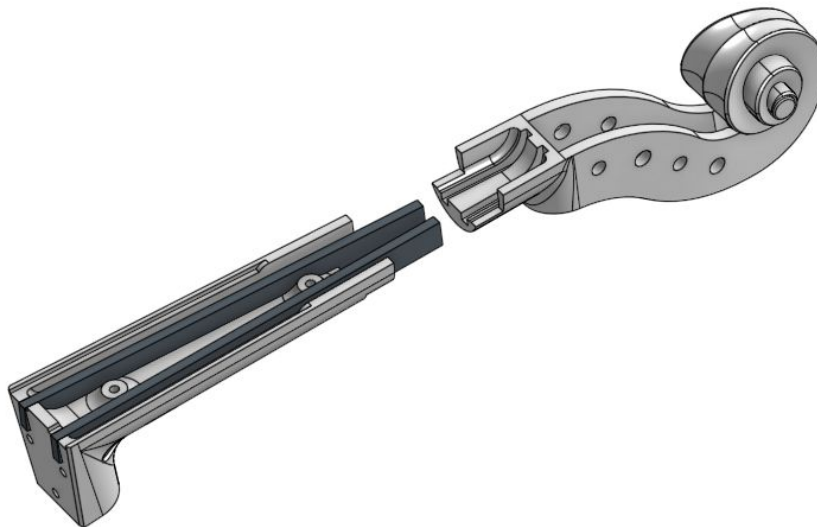
having trouble getting the parts to come together, you can look through the end pin hole of Body Aft R to see if the carbon bars are properly inserted into the Fore halves. Apply superglue to the seam, joining the five main chunks of the Body.



- 9) Angling the violin body *just right*, drip a few drops of superglue through the f-holes of the violin so that a bead of glue runs along the joint where the carbon fiber meets the inside of the body. Do this for both of the carbon fiber bars.
- 10) Test fit the Saddle in the rectangular recess near the aft of the body, on the front face. File if necessary, and then glue it in place.



- 11) Insert the two 138 mm carbon fiber rods into slots in the neck of the violin but do not glue them yet. Attach the scroll and make sure that it slides onto the neck without a seam. File the joint if necessary. When with the joint held flush, apply superglue, first to the seam and then to the carbon fiber rods.

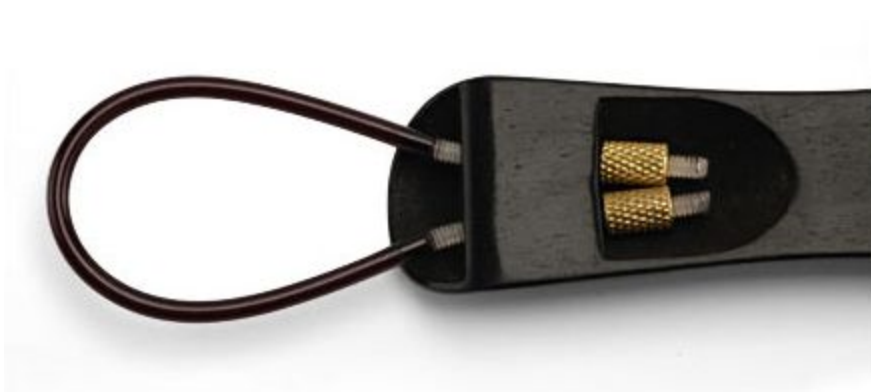


- 12) Make sure the peg holes are round and tapered. File them if necessary.
- 13) Slide two M3 nuts into the recesses in Fingerboard Fore, apply two small drops of glue to keep them from falling out. Don't get any glue in the nut threads!
- 14) Using clothespins only, assemble the 200mm carbon fiber bars and the Fingerboard Fore and Aft pieces. If the fit is good, apply superglue to the joints to join them together. Allow the superglue to dry.



- 15) The fingerboard should have a very uniform surface. File the top until it is very consistent across the top, and then wet-sand it with the two grits of sandpaper until it is smooth. Optionally, buff on a light coat of wax to give it a nice satin sheen.
- 16) Screw the fingerboard onto the scroll+neck assembly using two M3x10 screws.
- 17) Test fit the fingerboard+scroll+neck assembly on the body assembly, then screw it on using two M3x10 screws. This is the core assembly of the violin. Don't drop it! Some of the following steps can be skipped if you plan to use store-bought components, like bridges or pegs.
- 18) (Skip this step if you plan to use store-bought pegs) Insert the 48mm brass rods into the two holes on the inside of the pegs and slide them until they are flush with the tip of the peg. Drip some glue in the knob part of the peg and insert the white nub. Repeat this step to assemble four pegs. Make sure that the hole in the side of the peg does not get clogged with glue (If this happens, you can blow it out if the glue is wet, or drill it out with a 1mm drill).
- 19) (Skip these two steps if you plan to use a store-bought end pin) Insert the 1/8" steel pin into the tapered end of the End Pin and push it in. Apply some glue. Push the End Pin Insert into the head of the End Pin and apply some glue. File off the tip of the Insert until it is flush, and then sand smooth the head of the End Pin.
- 20) (Skip this step if you plan to use a store-bought tailpiece) Bend the 46mm brass rod so that it fits nicely in the groove of the Tailpiece. Clamp it down with clothespins and apply superglue to attach the rod to the Tailpiece.

- 21) (Skip these two step if you plan to use a store-bought chinrest) Insert the two M3x22 screws in the two holes in the Chinrest and screw on the M3 standoffs on the other end.
- 22) Insert the two M3x16 screws into the Chinrest Hook and screw them by hand loosely into the other end of the M3 standoffs of the Chinrest assembly. These will be tightened later when the Chinrest is attached to the violin. The violin is ready to be strung up, just like it was done traditionally! The following steps describe how to do just that.
- 23) Insert the four pegs into the holes in the neck/scroll assembly, but do not press them in tightly.
- 24) String the tailpiece fastener through the two holes and attach the brass nuts as shown (picture from stewmac.com):



- 25) Press the End Pin assembly firmly into the hole at the hole at the end of the violin body.
- 26) Loop the tailpiece fastener over the end pin and insert the three thicker violin strings nub ends into the four holes in the Tailpiece. They should be ordered (from left to right) G, D, A). The rightmost hole on the Tailpiece remains untouched for now.
- 27) Install the fine tuner on the rightmost hole. Hook the nub of the E string on the fine tuner.
- 28) Insert the ends of the strings into the holes in the pegs, and slowly tighten all of them, alternating. The strings are installed G,D,A,E clockwise from lower left.
- 29) When the strings are tight enough, place the Bridge with the string grooves corresponding to the string thicknesses (smallest groove under the E string to the right). The Bridge should line up between the notches on the f holes.



- 30) Wear Safety glasses while tuning or playing if your violin parts are made of brittle resin!
Tune the violin so that the strings are a fifth apart from the next, G,D,A,E where A is A 440 Hz. While tuning, make sure that the bridge stays upright; if it starts to slant too much it may fall over.
- 31) The violin is ready to play! Time to get practicing!

I hope you enjoy this design and please share it with others who might like it. I will keep the files public and free. For the intrepid designers, the source design can be found [here on Onshape](#).

Brian Chan