

Introduction to the Situation

I have decided to make my project for my GCSE resistant materials based on design task three.

Design Task 3

"Sporting and musical activities are very popular. Many need specialised equipment. Design and make an accessory or product for a sport or musical activity of your choice."

Problem:

I am a musician and I play lots of musical instruments, my main instrument being the violin. I would like to use a **violin stand** which would hold the violin and bow whilst I am not practising, as I have found this useful for my other instruments.

I have found it a challenge to find a sturdy violin stand, which is practical and attractive; the majority of violinists also have this problem.

The pictures below show the violin which I am making the stand for and also examples of stands I have for my other instruments. The stand would be practical as the violin case takes up a lot of room when storing it.



The violin case takes up a lot of the room when storing it



Both the guitar and flute have stands whilst my violin does not



My violin which I'm making the stand for

I will design the stand specifically for my own violin but I would like to consider finding a way of it being mass produced to suit other string instruments such as viola..



Violin securely held in it's case

Brief: To design and make a violin stand which will hold my violin and bow securely and effectively whilst still looking attractive.

Aim: to plan how I'm going to carry out my research and introduce my client who will advise me throughout my project.

Research Plan

- I need to research what stands are available to the market currently, their prices, the material it is made of and find out how it is put together. Also what the target market wants from a music stand.
- For my **primary research** I am going to borrow a violin stand and find the way it was put together, the materials it has used and identify any problems with it. Which will influence how I will approach making my violin stand.
- For **secondary research** I'm going to use a search engine such as www.google.com to find examples of existing designs, then analyse the different ways other designers have approached designing and making their violin stand.
- I am going to ask an experienced musician for their opinion on what I should include in my design and their ideas for how it should look and cost.
- I need to think about the social, moral and environmental factors of my project.

Conclusion: Now that I have planned this following section and introduced my client I am going to do some primary research to find out about existing stands.

My Client



To act as my client I have chosen my violin teacher – Rebecca Hamilton. She is a qualified violin and viola teacher with a B.A. in music. She does own a violin stand and she told me the problems she has with it:

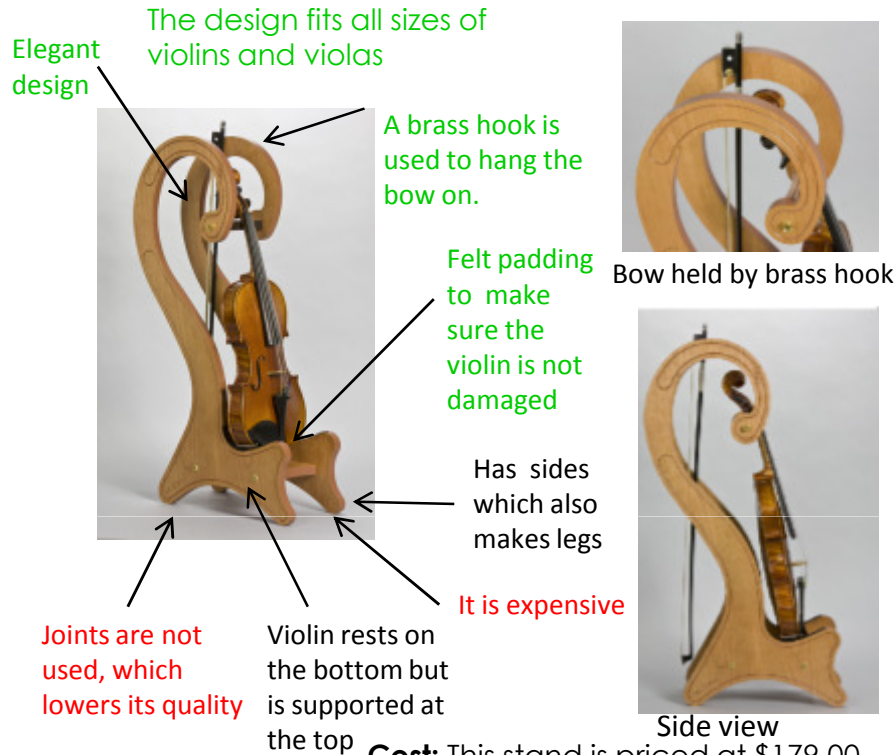
- A bit unstable
- No bow stand!
- not something she remembers to take with her to gigs
- portable but awkward to carry

She said she would be willing to pay around £15 for an average stand although willing to pay up to £40 for an exceptional, well made, sturdy stand. She suggested I used either metal or wood for the structure but use something such as foam so that there is a cushion to make sure the violin doesn't get damaged.

I feel my client agrees with the problems of current violins stands . She suggested I use the **foam** to cushion the violin, I thought this was a very good point and will use this suggestion for my design. She also pointed out that it didn't have a place to put the bow; my design **must include a bow stand** or it will not be practical. I have decided to make my stand one of which is designed to **stay in one place**, to display the violin on. So although it should be easy to carry I'm **not** going to design it especially for the purpose of easy portability.

Aim: to research existing products which will help promote originality in my design.

Existing designs Secondary research



Joints are not used, which lowers its quality

Details

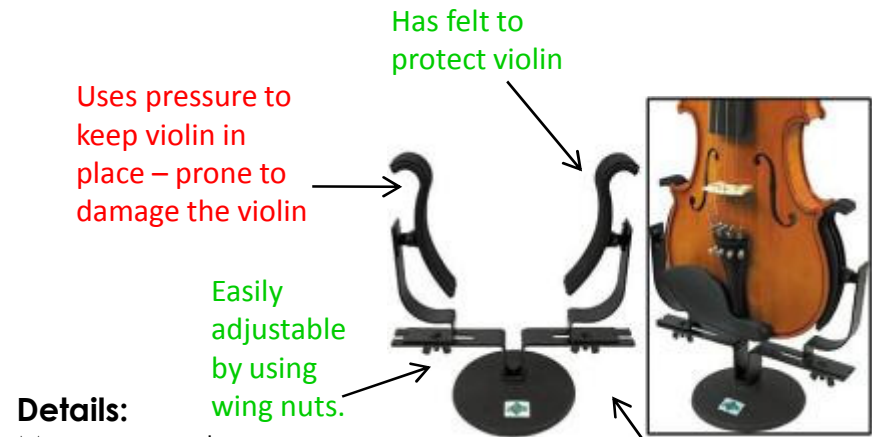
Measurements:
 height- 813mm
 width: 216mm
 depth: 356mm
 Weight: 2.7kg

Cost: This stand is priced at \$179.00 which is equivalent to £117.77

Material: Cherry veneer

http://helstromguitarstand.com/img/violin_stand_1.png

Design conclusion: I think this design is good because it can fit all sizes of violins, it looks sturdy and has an attractive and interesting shape. I like the unusual shape and I would like to incorporate this creativity into my design.



Details:

Measurements:
 Height: 280mm
 Width:240
 Depth:80mm
 Weight: (not specified)

Cost: \$22.99 which is the equivalent to £15.14

Material: metal

<http://band-orchestra.musiciansfriend.com/product/Belmonte-Violin-Viola-Stand?sku=466091>

Design conclusion: I think this stand is practical and does its job but it doesn't look nice and would be easily knocked over with such a small bass. However using the idea of pressure could to hold the violin could be useful concept to look into.

Conclusion: Through analysing existing stands it has helped me decide what I should include in the design of my own stand. Next I will compare all the existing designs and

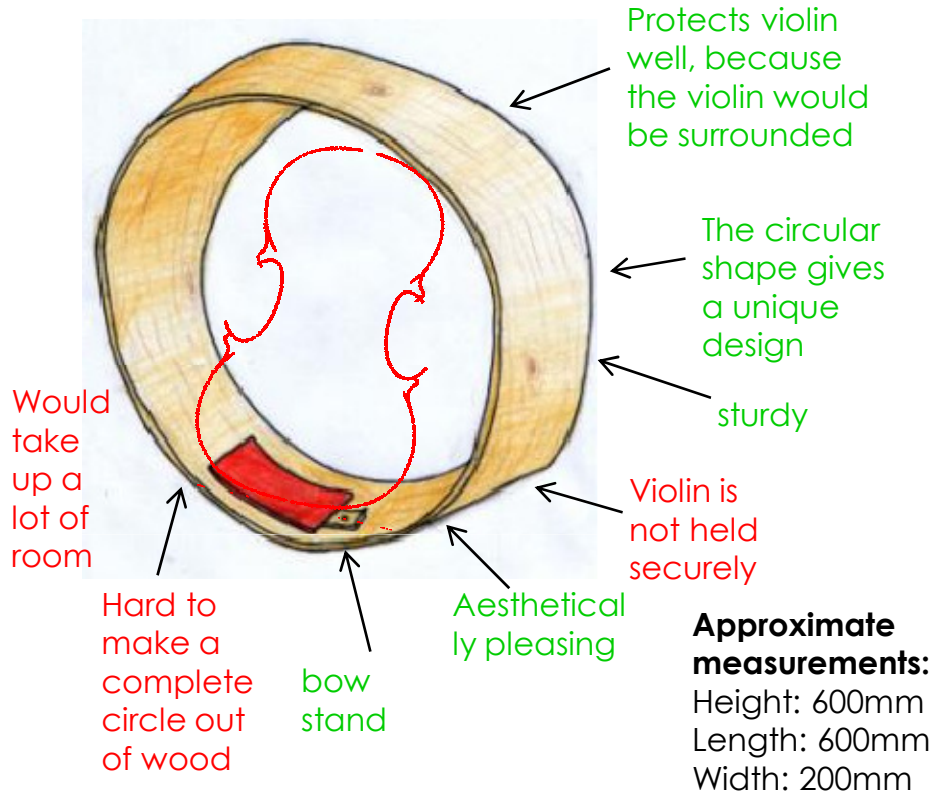
Aim: To confirm what features my final design should include

Specification

specification	Why?
1) Practical bow stand	So that the violin is held ASWELL as the bow or the stand will not be useable or practical
2) Hold the violin securely	This is so that the violin will not be at risk of damage
3) Protect the violin from damage	By using material such as foam or felt on the structure of the stand could protect it
4) Be sturdy	This will prevent the stand from falling or being knocked over – so protecting the violin
5) Easy to use	This is so that it is practical
6) Look appealing	It should look appealing so that the consumer would want to buy the product and also look nice when displaying the violin
7) Fit the violin snugly	It must be snug so that the violin will be held securely with no worries if it is knocked, to do this I will use the ergonomics of the violin
8) Maximum size	The maximum size of my violin stand should be no larger than : height: 750mm, width: 400mm, depth, 400mm
9) Minimum size	As long as the stand holds the violin suitably I will not set a minimum size
10) Cost should not exceed £25	I will spend no more than £25 so that if I was to mass produce it I would sell then at a profit, and a price which is affordable yet suggests high quality
11) Weight should be around 2K	I feel if I make the stand about this weight it will feel sturdy and good quality yet it would be lift-able and practical too
12) Made out of wood and/or metal	I want to make it out of wood as this suggests quality and it is also aesthetically pleasing
13) Be easily maintained	Use common “off the shelf” components so that the consumer can fix it easily if it were to break
14) Be environmentally friendly	I must consider this when making the product so that I am environmentally friendly
15) Not too bulky	So it is not too large, or heavy for the costumer

Aim: to analyse three of my designs in detail

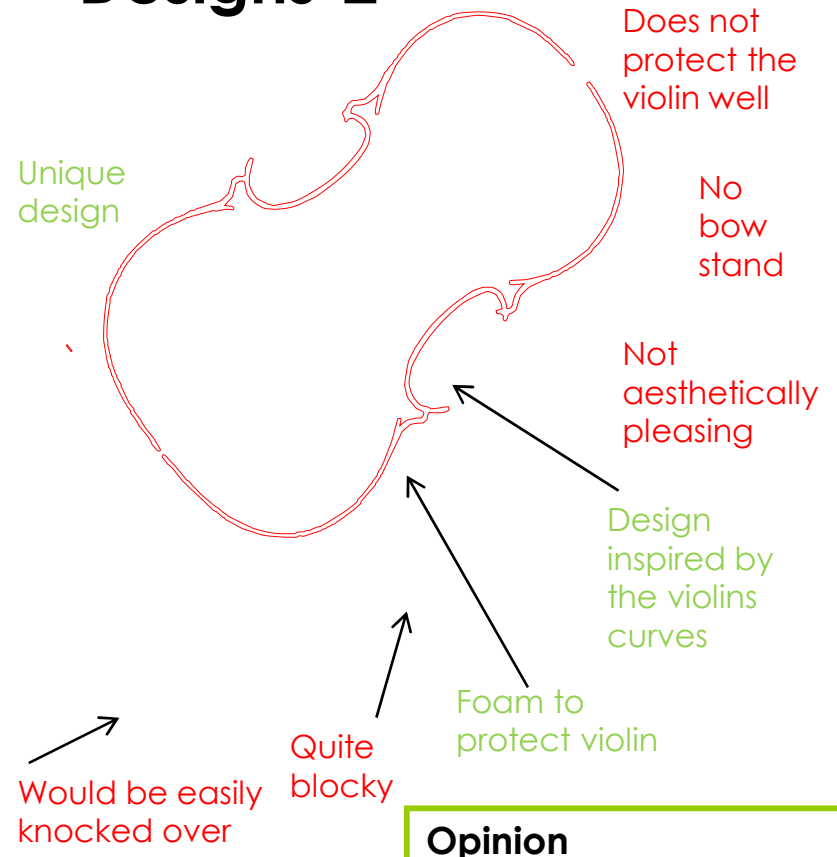
Designs-1



The red outline of a violin shows where the violin would be placed. As one of my first initial ideas I wanted to play with the shape of the stand to make it unique. I think the circular shape is aesthetically pleasing however it isn't very practical.

Opinion
I like the circular design but I think it is very important that the violin is held securely and this design doesn't fulfil that however it does have a bow stand.

Designs-2



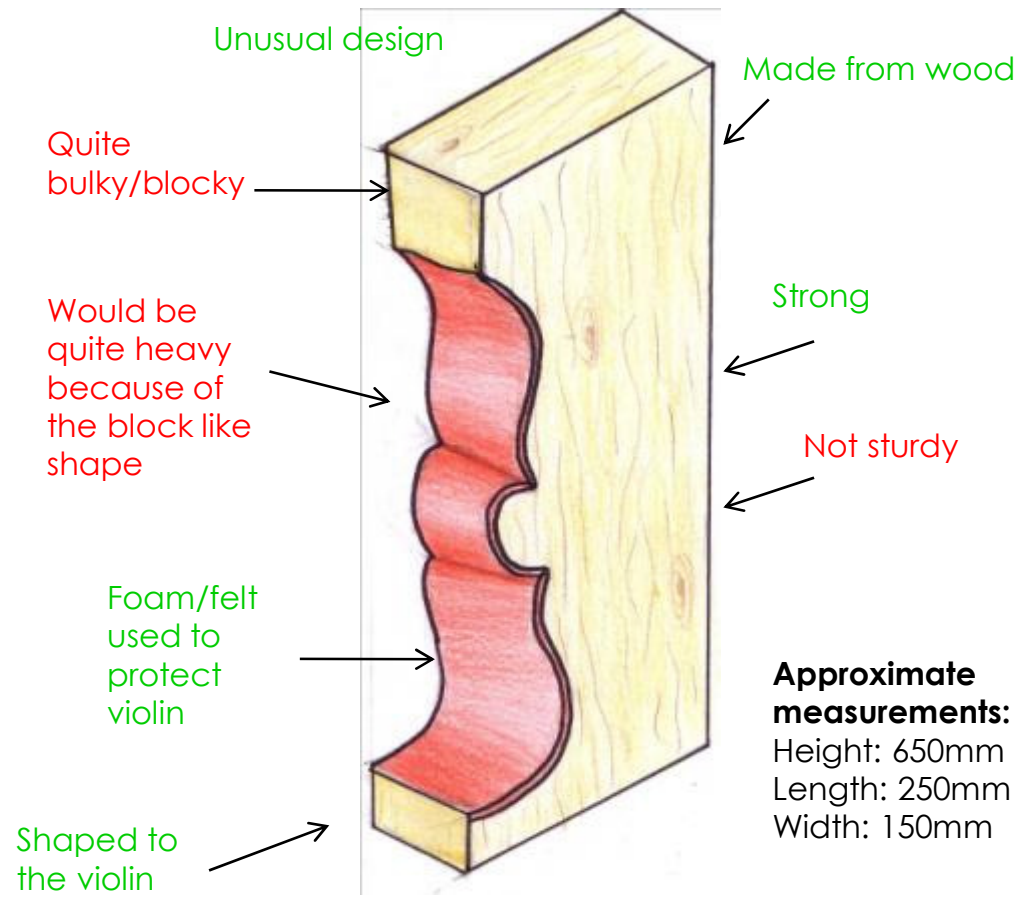
Approximate measurements:
Height: 200mm
Length: 350mm
Width: 150mm

The red outline of a violin shows how the violin would be supported.

Opinion
I like this design because of its unique way it plays with the curves of the violin to hold it securely, however the design would have to be less blocky and more protective if I was to use this idea.

Aim: To continue analysing my designs

Designs-3



The idea for this design was based on the concept of my "design 2" by using the curves of the violin however I rotated the design and developed it to create a new design.

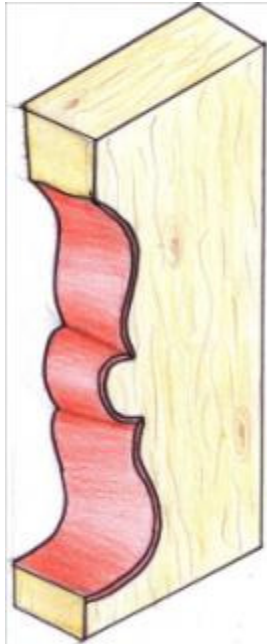
My opinion
I love the fact it is completely original as I have never seen another violin stand which works in this way.
However I think it would be too bulky and I think it could look more modern and artistic if I experimented with using metal as well.

Conclusion: I feel the good points on this design far out way the bad points and it is my personal favourite compared to the rest of my designs. Next I will compare my 3 designs to my specification.

Conclusion: Next I will compare my designs to my specification.

Design Development

Aim: To investigate ways of solving the problems, highlighted on the specification, with design 3



Design 3

I have decided to **develop design 3** further as I think it has the most potential and it is original and unusual.

From comparing this design to my specification I found that:

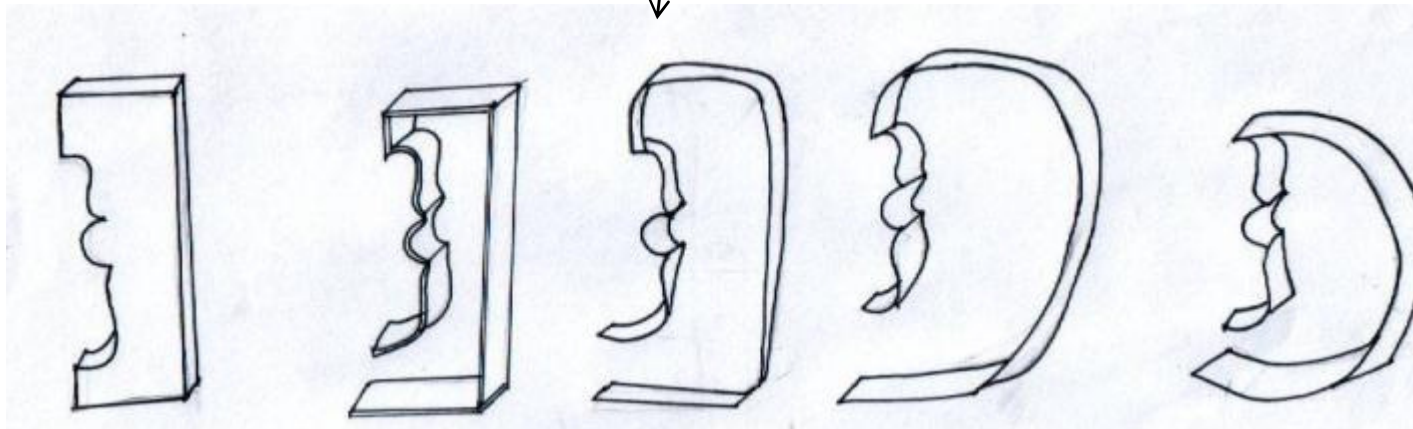
- it was too bulky
- does not protect it from damage
- no bow stand
- Too heavy

To make the stand **less bulky** I decided to **hollow** out the design to just a frame. These are the designs I came up with . I also experimented with the shape of the design from changing it from the more **rigid to circular**.

However I think under the weight of the violin that the most circular one is likely to bend and maybe snap.

In the designs below I have not drawn support under where the violin would be placed which would make it prone for breaking as it is a weak point.

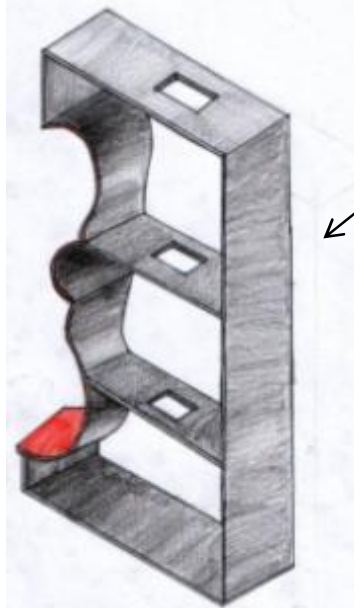
Also in these designs I have not thought about a bow holder.



My design hollowed then curved.

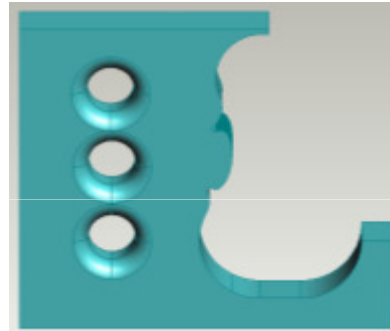
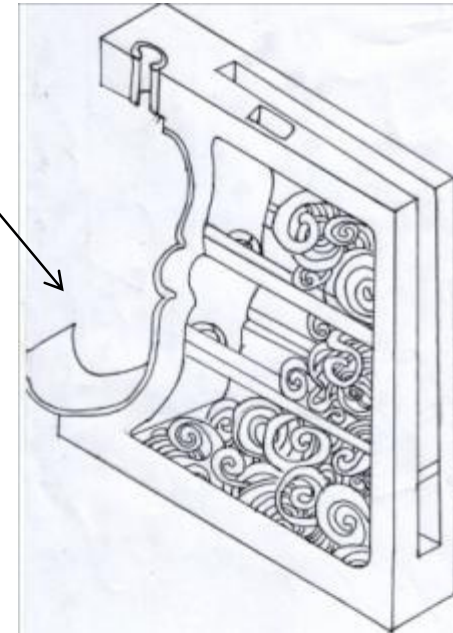
Further Development...

Aim: To identify and solve the problems with my design to develop it further

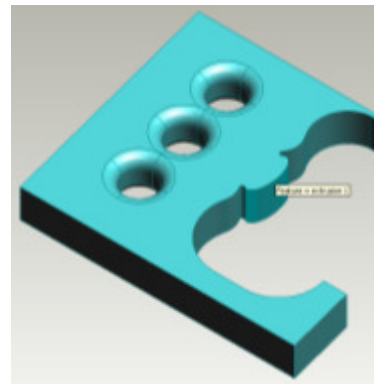


I then developed the hollowed out stand by including supports in the middle of the structure and also at the base of the violin. It includes a bow holder which is necessary for the design. However I think this design lacks creativity and looks quite industrial and ugly.

I continued working with this idea. I then drew this design. It includes swirls of metal to make it look more stylish. However I still think that it is too block like.



I then drew the design using "ProDesktop" so that it was clear to see and showed my ideas from all angles. I still believe the design using three circles for elegance looks too box like and boring.



Opinions...

Shannon- Doesn't protect violin, no space for anything on the shelves, may wobble,

Naomi- Nice, the bow holder needs work to keep the violin in the stand, fill in the middle, feet to keep it stable, should be made of wood

Claire- Change the bow holder to clips, the violin wont stay in, make the square side less angular, a hook around the neck of the violin

Mr Smith- looks quite industrial, the straight side should have curves

Conclusion: I have yet to decide on a design to fully develop. Next I will make a model based on the basic design on the top left, this will help me foresee any immediate problems with my design.

Model making

To develop my design further, I decided to make a model. I made it **full sized** to see if it was fully functional. I drew around my violin on to hard board and cut it out so that I have the **exact violin dimensions** to work my model around.

I made my model out of a large piece **polyurethane foam**; however unlike my design I decided to cut out holes in the big piece instead of constructing the frame out of lots of separate pieces, then putting them together this means my model will be **stronger**, this is also something to consider for my final design.

When I make the design I won't be able to make it out of one piece of wood as it would be prone to breaking because the grain would only go in one direction so I would have to laminate some pieces of wood together.



This is the violin being drawn around for the template and the finished template

Problems I found from making my model:

- the base is not stable
- it could be thinner to make it less bulky
- it could look more elegant and less blocky looking
- the part holding the underneath of the violin has to be longer to give the violin more support
- something is needed at the top to hold the neck of the violin



Pictures of my model

Problem solving

Problem: not enough support for the violin.

Solution: By extending the top of the stand to around the violins neck it will support it even more, so it is held at the top keeping it against the frame.

By extending the base where the violin is held, the violin will be more supported.

Problem: it looks ugly

Solution: I will experiment with less blocky looking shapes to create an elegant feel also I could include another material to contrast with the wood for example aluminium metal as it polishes up well and is cheap.

Problem: it looks too bulky

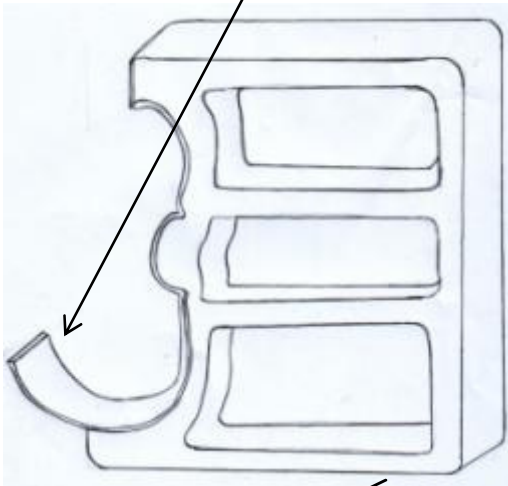
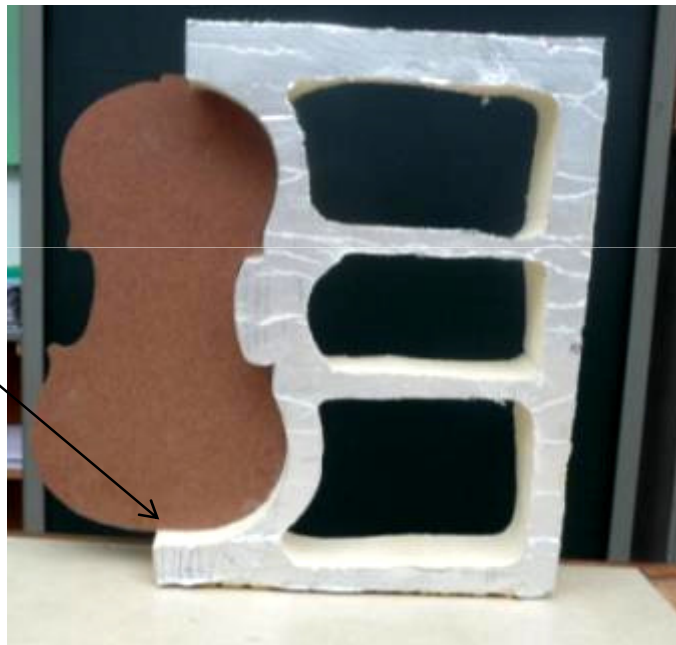
Solution: I will make the frame thinner and by using a shape less blocky it will give a more elegant look. Also to experiment with different thicknesses so that it looks less 2d.

Problem: the base isn't stable enough.

Solution: I will experiment with "feet" for the stand so that it has a bigger base, therefore making it more stable.

Conclusion:

Now I have pointed out its problems, I am going to work on a design that resolves them.



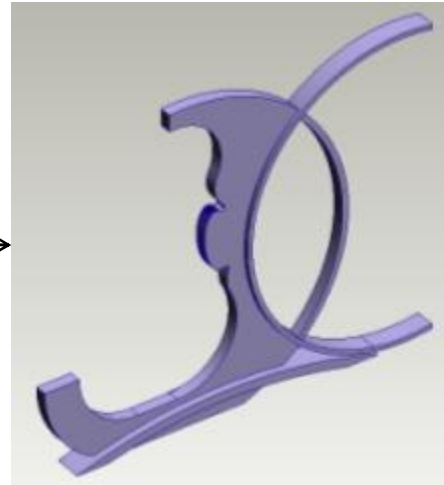
In this drawing I have extended the base so that it is more supportive. This idea will be included in my final design.

Problem solving continued...

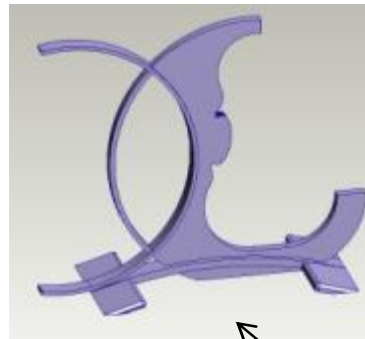
After considering all the problems in my model I came up with this stand as a solution. This stand came from the inspiration of a coat stand design that I saw in a magazine.



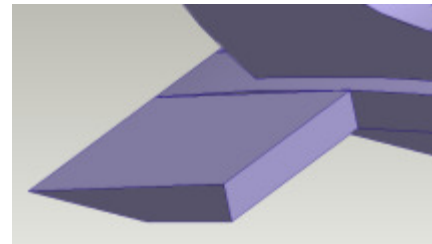
This is the coat stand which I found, I love the elegant curves and contrast between the different coloured woods. I decided to use these ideas of elegance, curves and contrast in my own design.



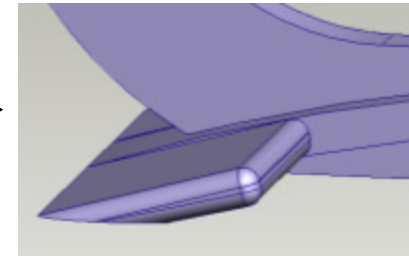
This is my design which I've taken inspiration from the coat stand for. I like the unusual design of this stand as I think it gives an organic feel also I have never seen a violin stand like this. From here I need to add feet as it won't be stable enough because it is very tall. I decided to draw it on Pro-desktop so that I could see any immediate problems also to gain a 3d picture to work from.



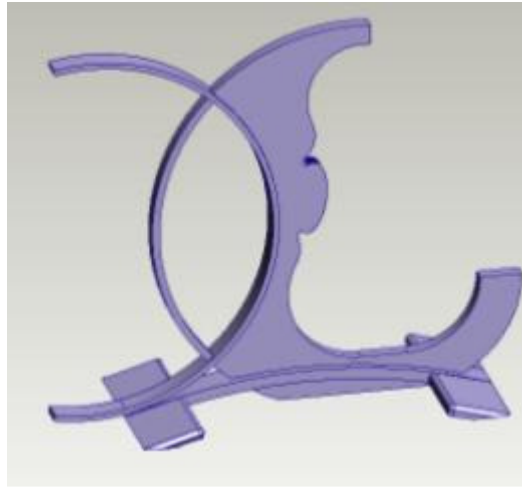
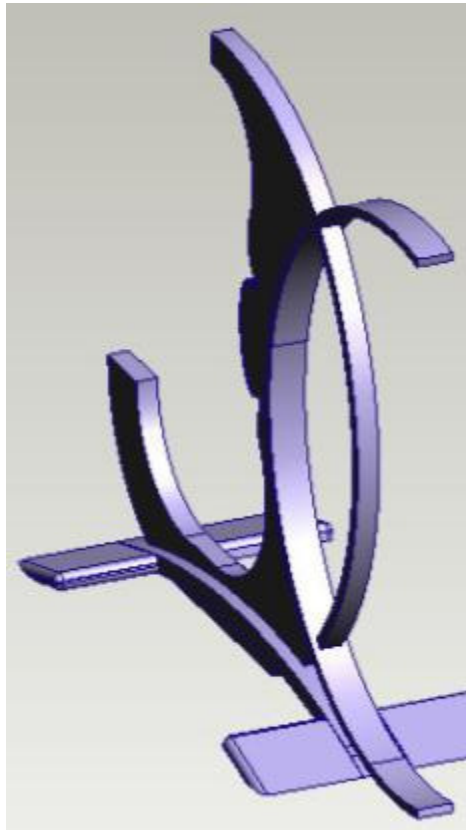
This is my design with "feet" they follow the natural shape of the stand and I made the edges curved



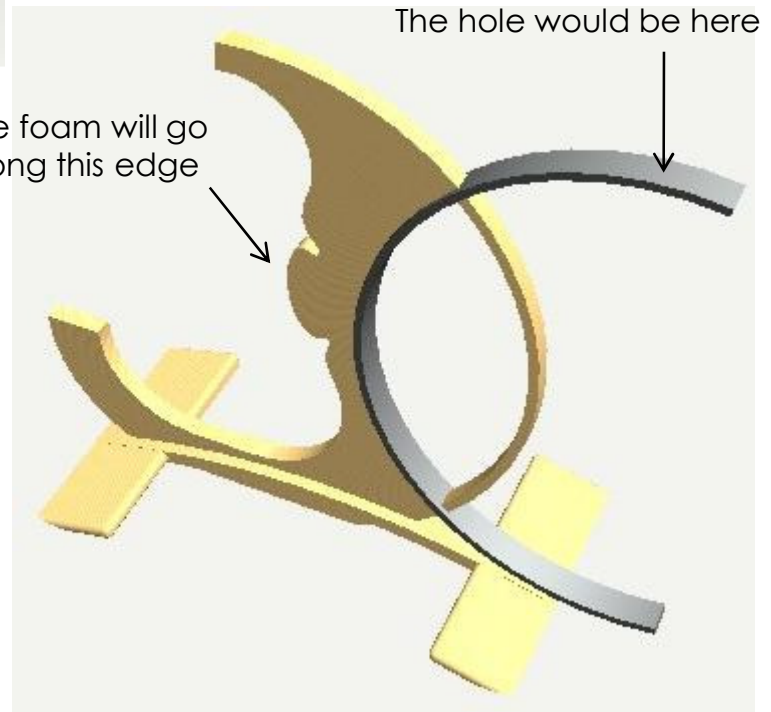
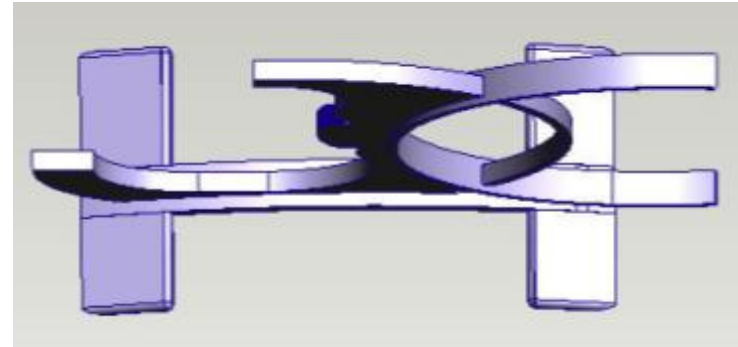
I rounded the edges to create a smoother effect, to complement the curves of the stand



Drawings of my final design



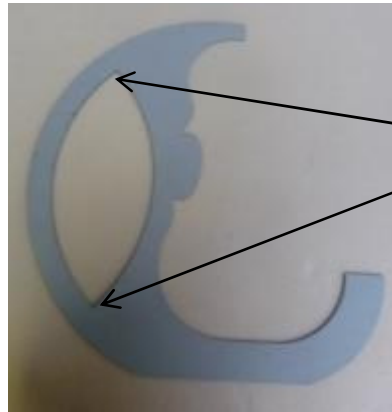
The drawings are missing the foam along the inside, and also the hole in the metal to stand the bow in.



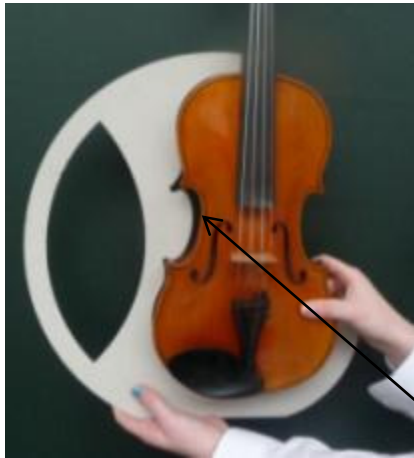
Making my product

To start my project I cut out the violin outline using the laser cutter, from cardboard that I had drawn on pro-desktop to see if it was accurate fit.

In the design there was a few gaps where the shape did not fit with the violin accurately so I changed the shape to fit it snugly, then cut out the newly modified template again.

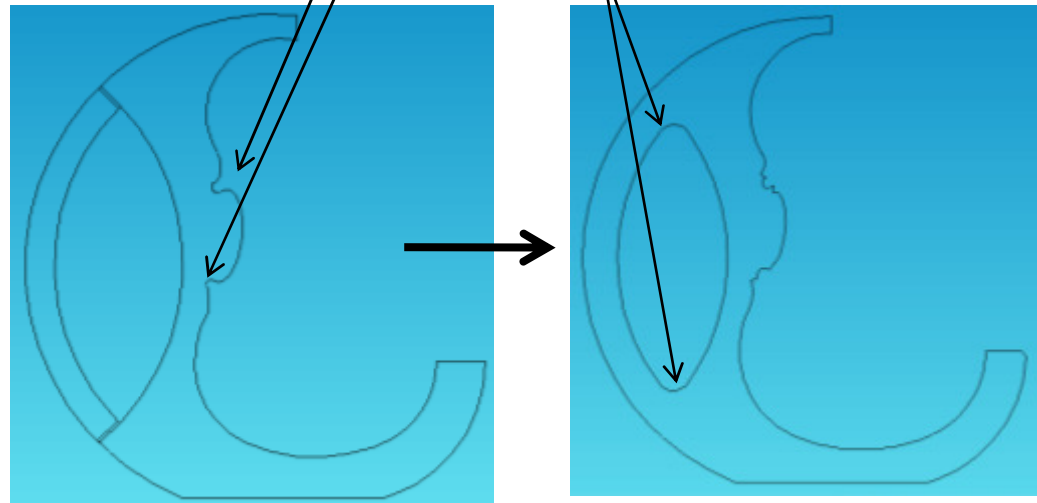
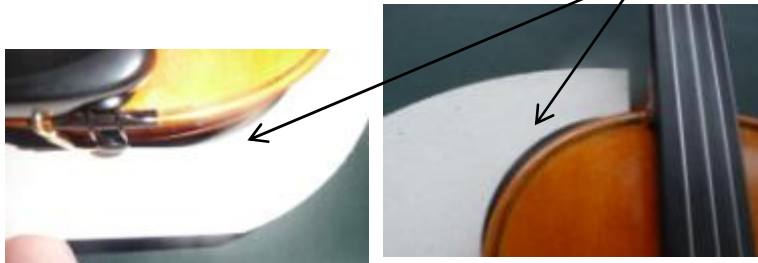


I found that the stand would be weak at the corners of the hole, so I rounded them and made the hole slightly smaller so that the design would be physically stronger. As I'm going to put foam around the inside of the design to stop the violin from being damaged so I took off a 6mm from around the violin outline so that I have accounted room for the foam.



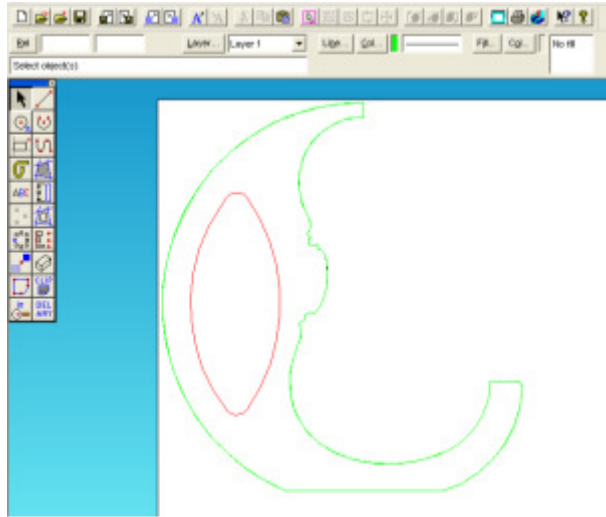
Originally I was going to put foam all around the inside of the violin outline but I changed this because the foam wont fit into the tiny gaps. Also I found it will be weak in the corners of the oval so I rounded them too.

These pictures show where the violin doesn't fit the template well.

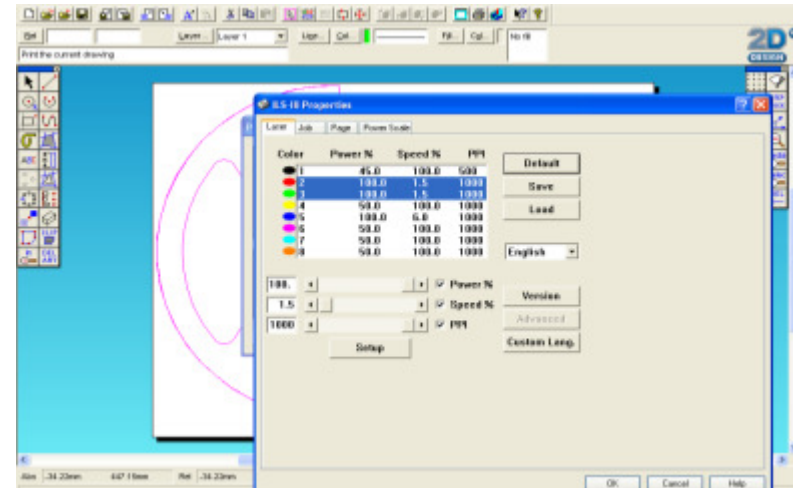


Making the template

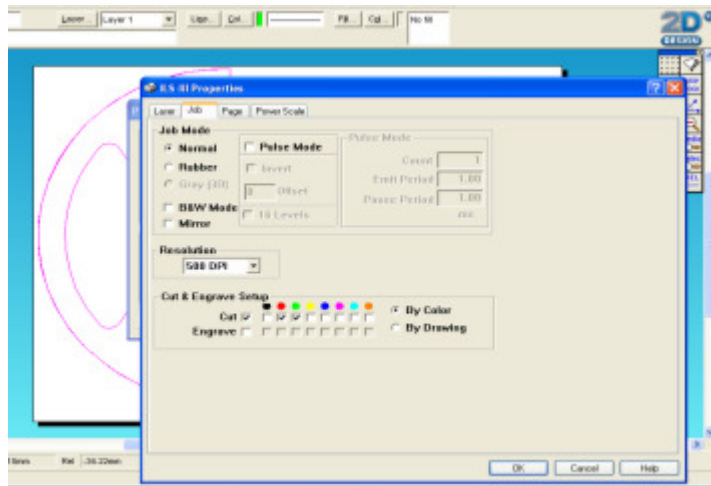
I made my template using the Laser cutter.



I put a green 0mm contour around the outside of the template and a red 0mm contour inside the hole.



I selected the whole drawing and went to the print menu. I selected "red" and "green" to chose the colour line it needed to cut out. Then put the speed at 1.5 and the power to 100. Then selected setup.



I clicked "job" tab at the top, and selected the "green" and "red" colour boxes. Then selected "ok." The machine then cut it out.



This is the laser cutter cutting out my template.

Laminating the legs



We made up a former to shape the pieces of laminate to, so that each curve will be the same.



Cut 5 pieces of wood the same size and glued them together using glue.



I clamped it together to keep the former tight around the pieces of wood. Then I wiped off the excess glue.



This shows how the pieces of wood are clamped together in the former.



This is the piece once it was left for 24 hours in the former.



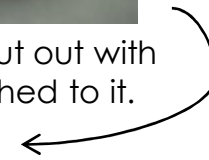
My teacher also cut the sides of the piece so that they were straight.

I then made another leg in the same way.

Cutting the main body continued



This is the main body cut out with the template still attached to it.



I stuck the template back onto the wood using double sided sticky tape. Next I used the follower router again to make the wood exactly the same shape as my template. I wore safety goggles to protect my eyes.



After taking off the template of the main body I put the template of the legs next the main body. I decided that the legs would look too small.

The template on top of the actual leg is the proposed size of the legs. I've decided to use the legs at a longer length.

I lined the legs up at full length, I believe this looks more in proportion.

Making continued



This is how the foot will sit against the leg, this enables the stand to have a large base so that it is stable.



I glued both surfaces and stuck them together using PVA glue.



I clamped the feet and legs together so that the feet would set in the right place.



These are the legs after the feet had been stuck on. The feet do not match exactly the shape of the leg.



I planed the surface of the feet so that they became level with the legs by using a plane



I also used the belt sander to round slightly the pointed ends of the feet and legs so that they had a straight edge to them.

Making continued



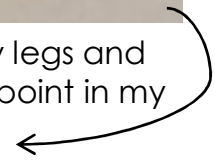
This is the leg and foot joined together after being planed and sanded to give a smooth finish.



This is one of the whole legs after being joined together.



These are both my legs and main body at this point in my making.



I over estimated the amount of work to complete in my project, so that I could finish my teacher and the technician made and fitted the metal curve of my work for me. They first bent a piece of strip aluminium metal around a metal former.



Then they made a wooden template the same shape of the curve so that the follower router could follow the template to cut out a halving joint in the wood so that the metal could slot inside.



They used the follower router to follow the template to cut the joint exactly.

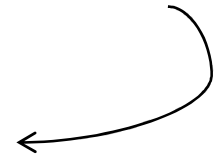
Making continued



I put all the pieces together to make sure they all fitted. I also marked on the strip metal where I wanted it to end. My teacher cut it at these points and then also cut a hole in the top and bottom of the metal for the bow to stand in, then sandblasted the metal to give it a dulled effect.



I then marked all the edges which needed to be rounded and the edges on the legs which were to be chamfered before varnishing and gluing it together.



I covered the parts of my project which I didn't want to varnish with masking tape then I varnished both the legs and the main body three times with a light sanding with fine aluminium oxide paper in-between.



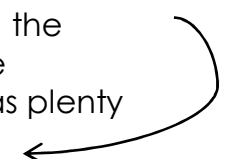
After two coats of varnish I put PVA glue on the main body and the legs to stick them on.

Making continued

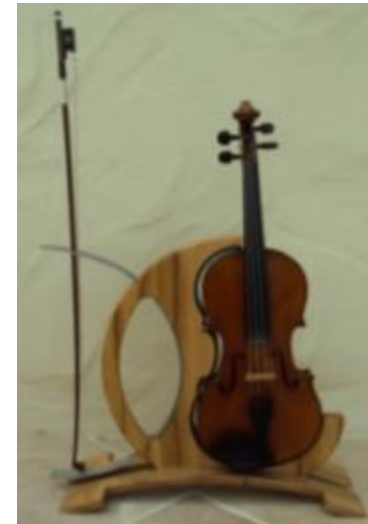


Then clamped all the pieces in place to dry. I then gave my project a final coat of varnish on the wood, and left to dry.

The last thing to do was to stick the foam along the edge of where the violin sits. I put instant contact glue onto both the wood and the foam the left until it was touch dry before pressing together to form a bond. I made sure there was plenty of ventilation in the room before gluing.



Here is my final product, with all parts finished.



This is my finished stand displaying my violin.

Finished product



Aim: To give my opinion of my finished design and also other peoples opinion



This is my final pro-desktop drawing of the design that I envisaged.



This is my finished design.

Evaluation

My opinion

I love my final design, it fits perfectly in my room and I think I have fulfilled much of my specification well.

I am very pleased with the look of it, it is aesthetically pleasing and doesn't look ugly or out of place in a home. I also like the contrasting use of metal and wood because it makes it have a modern and elegant feeling. I think I did chose the correct materials for my project because they create a lovely contrast and also make the stand sturdy and natural looking.

There are only a few aspects of my project that I am unhappy with. I found that although the violin is held quite securely the stand doesn't fit exactly to the shape of the violin, there are a few gaps. This means that the violin is held in place in fewer places.

Also when gluing my project together I accidentally got some glue on to the metal curve which doesn't come off, this makes my project look slightly less high quality however it can't be seen from afar.

I think the finish of my product is of very high quality, and the stand is very stable on the floor, and feels substantial to touch and pick up. It could endure being knocked over and played with.

I also realised that I set my self too big a task to complete in the time limit given, so my teacher had to finish the metal curve for me.

My design is very similar to my drawing of it, there are only a few things that I changed whilst making it. The wooden part between the metal is much thicker, I did this so that it was less likely to break. Also I found that when making my design, the leg size that I proposed were too small to I made them bigger therefore also making my stand more stable.

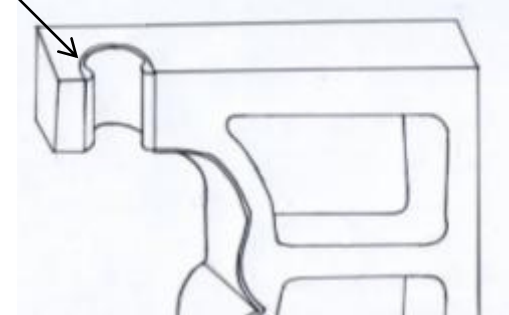
Aim: How I could improve my product based on the criteria of the specification that it didn't fill

Improvements



When I compared my product to my specification I found that, it didn't hold the violin securely, and it didn't fit the violin snugly. These photos to the left show the gaps where the violin should be held against it closely to keep a tight fit.

This is how I plan to make the violin sit **more stable** in the stand. The concept is that the neck is held in place in a gap. I could put foam around the edge of it so that when you push in the neck of the violin it will slide through then the foam will expand to hold it in place also with little force it can be taken out. This means you can take the violin on and off the stand with ease whilst being held into position.



Industrial production

If my product was to be made commercially, a CNC router would be used to cut out all the wood, this makes them all identical. The legs would be steam bent. The metal would be curved using a hydraulic bender. Also a sanding machine and varnish machine would be used to treat the wood.

The market for this product could be made bigger by extending the range of sizes to fit violas too. (Violas a slightly larger violins.)